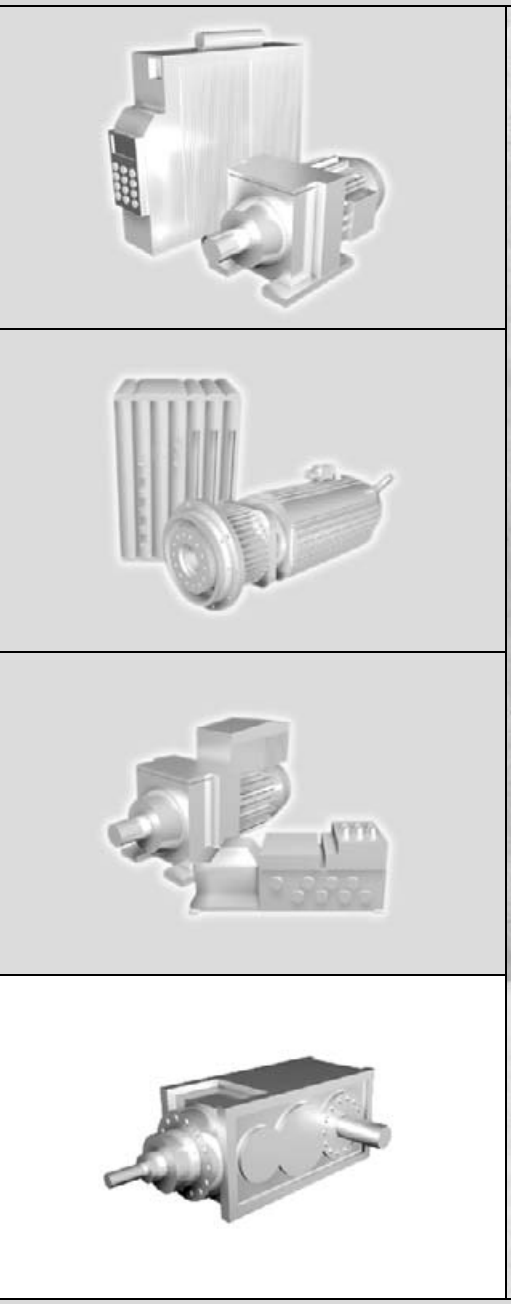
SEW EURODRIVE



Industrial Gear Units of the MC.. Series

GD110000

Edition 11/2005

11357614 / EN

Operating Instructions

SEW EURODRIVE

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1 Important Information about the Operating Instructions

1.1 Important information and designated use

Integral part of the product

The operating instructions are part of the MC.. industrial gear units and contain important information for operation and service. The operating instructions are written for assembly, installation, startup and service employees who are involved in the installation and maintenance of MC.. industrial gear units.

Designated use

The designated use refers to the procedure specified in the operating instructions.

The MC.. industrial gear units are units run by motors for industrial and commercial systems. Gear unit utilizations other than those specified and areas of application other than industrial and commercial systems can only be used after consultation with SEW-EURODRIVE.

In compliance with the EG Machinery Directive 2006/42/EC, the MC.. industrial gear units are components for installation in machinery and systems. In the scope of the EG directive, you must not take the machinery into operation in the designated fashion until you have established that the end product complies with the Machinery Directive 2006/42/EC.

Qualified personnel

MC.. industrial gear units may represent a potential hazard for persons and material. Consequently, assembly, installation, startup and service work may only be performed by trained personnel who are aware of the potential hazards.

The personnel must be appropriately qualified for the task in hand and must be familiar with the assembly, installation, startup and operation of the product. The personnel must read the operating instructions, in particular the safety notes section, carefully and ensure that they understand and comply with them.

Liability for defects

Incorrect handling or any action performed that is not specified in these operating instructions could impair the properties of the product. In this case, you lose any right to claim under limited warranty against SEW-EURODRIVE GmbH & Co KG.

Product names and trademarks

The brands and product names contained within these operating instructions are trademarks or registered trademarks of the titleholders.

Waste disposal

(Please follow the latest instructions):

- Housing parts, gears, shafts and roller bearings of the gear units must be disposed of as steel scrap. This also applies to gray-cast iron parts if there is no special collection.
- Collect waste oil and dispose of it according to the regulations in force.

1.2 Explanation of symbols

Hazard

Indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.

Warning

Indicates an imminently hazardous situation caused by the product which, if not avoided, WILL result in death or serious injury. You will also find this signal to indicate the potential for damage to property.

Caution

Indicates a potentially hazardous situation which, if not avoided, MAY result in minor injury or damage to products.

Note

Indicates a reference to useful information, e.g. on startup.

Documentation reference

Indicates a reference to a document, such as operating instructions, catalog, data sheet.

1.3 Operating notes

- **It is essential to contact SEW-EURODRIVE regarding a subsequent change of mounting position!**
- **The industrial gear units of the MC.. series are delivered without oil fill. Refer to the information on the nameplate!**
- **Refer to the instructions in the sections "Mechanical Installation" and "Startup"!**

2 Safety Notes

2.1 Preface

The following safety notes are concerned with the use of MC.. industrial gear units.

If using gearmotors, please also refer to the safety notes for motors in the corresponding operating instructions.

Please also consider the supplementary safety notes in the individual sections of these operating instructions.

2.2 General information

Never install damaged products or take them into operation.

Submit a complaint to the shipping company immediately in the event of damage.

During or after operation, industrial gear units and motors have:

- Live parts
- Moving parts
- Hot surfaces (may be the case)

Only qualified personnel may carry out the following work:

- Installation / assembly
- Connection
- Startup
- Maintenance
- Servicing

The following information and documents must be observed during these processes:

- Relevant operating instructions and wiring diagrams
- Warning and safety signs on the gear unit
- System-specific regulations and requirements
- National / regional regulations governing safety and the prevention of accidents

Serious injuries and property damage may result from:

- Improper use
- Incorrect installation or operation
- Unauthorized removal of necessary protection covers or the housing

Transportation

Inspect the shipment for any damage in transit as soon as you receive the delivery. Inform the shipping company immediately. It may be necessary to preclude startup.

Startup / operation

Check that the direction of rotation is correct in decoupled status. Listen out for unusual grinding noises as the shaft rotates

Secure the key for test mode without output elements. Do not deactivate monitoring and protection equipment even for testing.

Switch off the main motor if in doubt whenever changes occur in relation to normal operation (e.g. increased temperature, noise, vibration). Determine the cause and contact SEW-EURODRIVE, if required.

Inspection / maintenance

Refer to the instructions in Sec. "Inspection and Maintenance."

2.3 Personal protective equipment

Always wear the following when carrying out work on the gear unit:

- Tight-fitting clothing (not prone to tear, no loose sleeves, no rings, etc.).
- Safety glasses for protecting the eyes from falling objects and liquids.
- Safety shoes for protection against heavy falling objects and slipping on a slippery floor.
- Hearing protection for protection against hearing damage for sound pressure levels exceeding 80 dB (A).

2.4 Transport of industrial gear units

Transport eyebolts

Tighten screwed in transport eyebolts [1] firmly. They are only designed for the weight of the industrial gear unit including the motor connected via motor adapter; do not attach any additional loads.

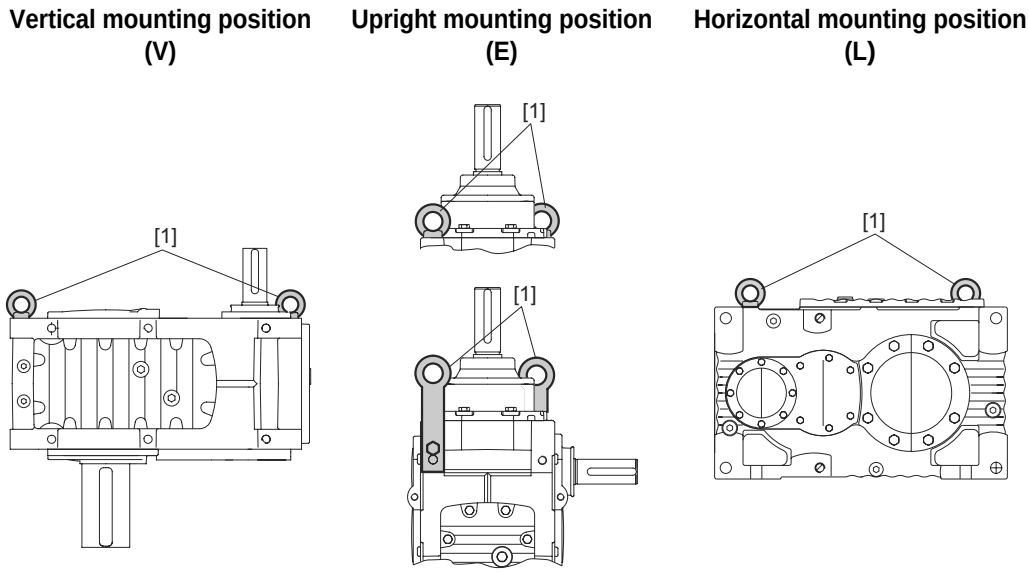

Figure 1: Positions of transport eyebolts

- **The main gear unit must only be lifted using lifting ropes or chains on the two screwed in transport eyebolts on the main gear unit. The weight of the gear unit is indicated on the nameplate or the dimension sheet. The loads and regulations specified on the nameplate must always be observed.**
- **The length of the lifting chains or ropes must be dimensioned in such a way that the angle between the chains or ropes does not exceed 45°.**
- **Eyebolts on the motor, auxiliary gear unit or primary gear unit must not be used for transport (→ following figures)!**

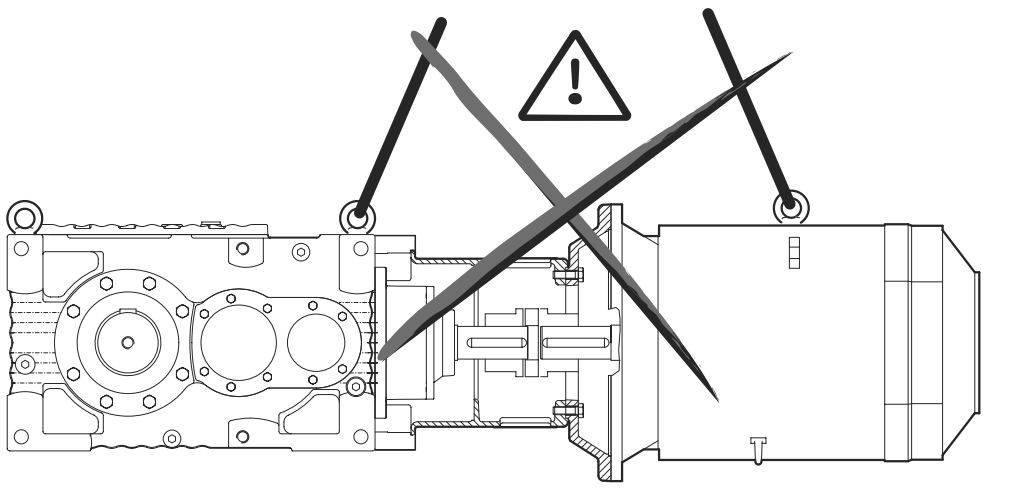

Figure 2: Do not use eyebolts on the motor for transport

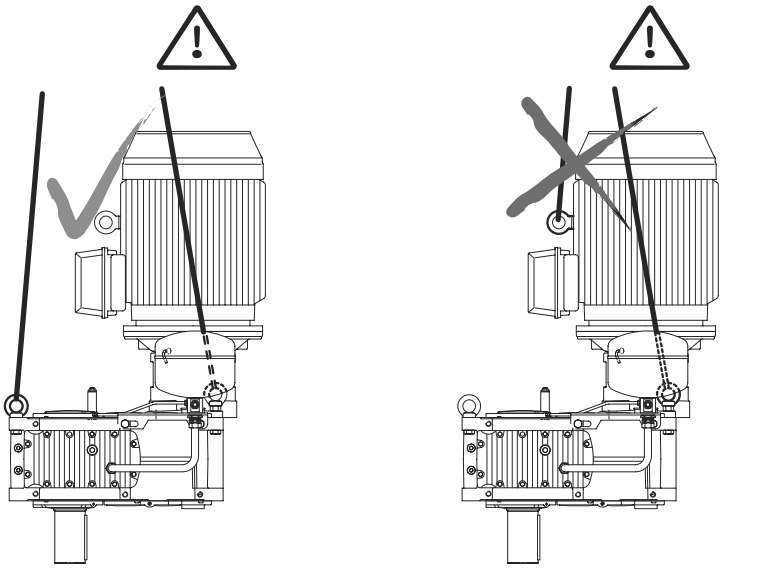

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Figure 3: Do not use eyebolts on the motor for transport

- **Use suitable, sufficiently rated handling equipment if necessary. Before startup, remove securing devices used for transport.**

Transport of MC.. industrial gear units with motor adapter

Industrial gear units of the **MC.P.. / MC.R..** series **with motor adapter** (→ following figure) must **only** be transported using **lifting ropes/chains [2] or lifting belts [1]** at an **angle of 90° (vertically) to 70°**.

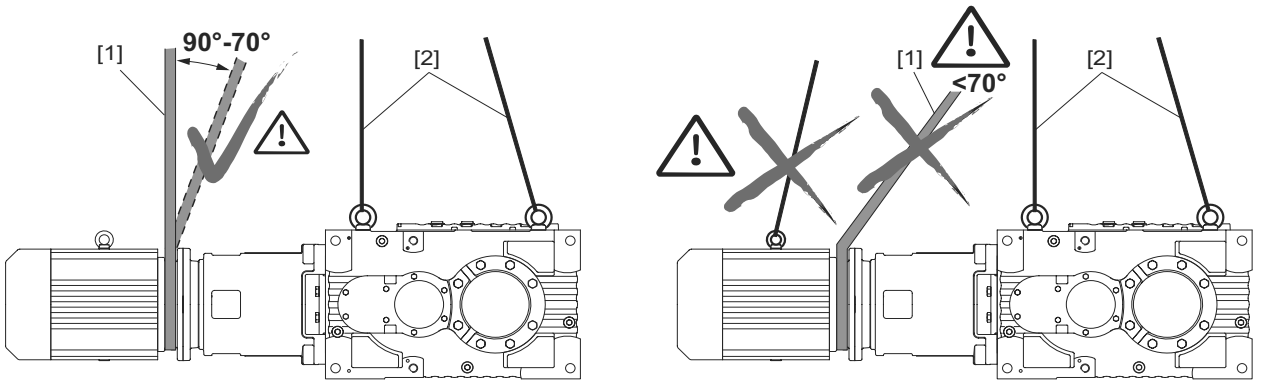

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Figure 4: Transport of industrial gear unit with motor adapter – Do not use eyebolts on the motor for transport

Transport of MC.. industrial gear units on a base plate

Industrial gear units of the **MC** series **on a base plate** (→ following figure) must **only** be transported with the **lifting ropes** [1] or chains (angle 90°) **vertically** to the base plate:

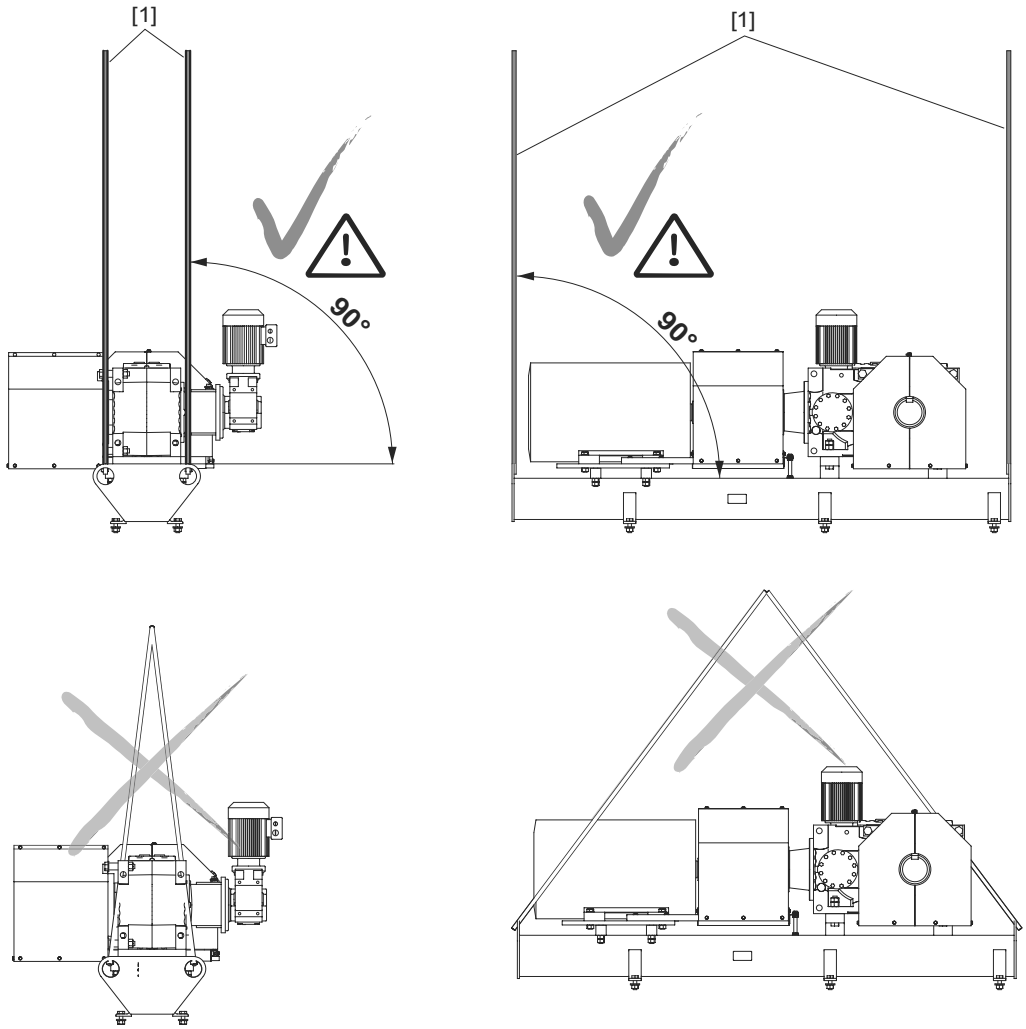

Figure 5: Transport of MC.. industrial gears unit on a base plate

Transport of MC.. industrial gear units on a swing base

Industrial gear units of the **MC series on a swing base** (→ following figures) must **only** be transported using **lifting belts [1]** and **lifting ropes [2]** at an **angle of 90° (vertically) to 70°**.

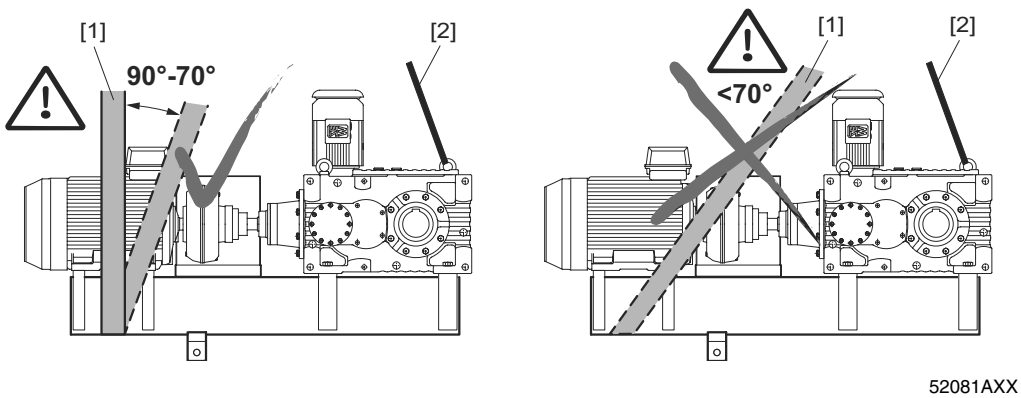

Figure 6: Transport of MC.. industrial gear unit on a swing base

Transport of MC.. industrial gear units with V-belt drive

Industrial gear units of the **MC series with V-belt drive** must **only** be transported using **lifting belts [1] and lifting ropes [2]** at an **angle of 90° (vertically)**. The eyebolts on the motor must **not** be used for transport.

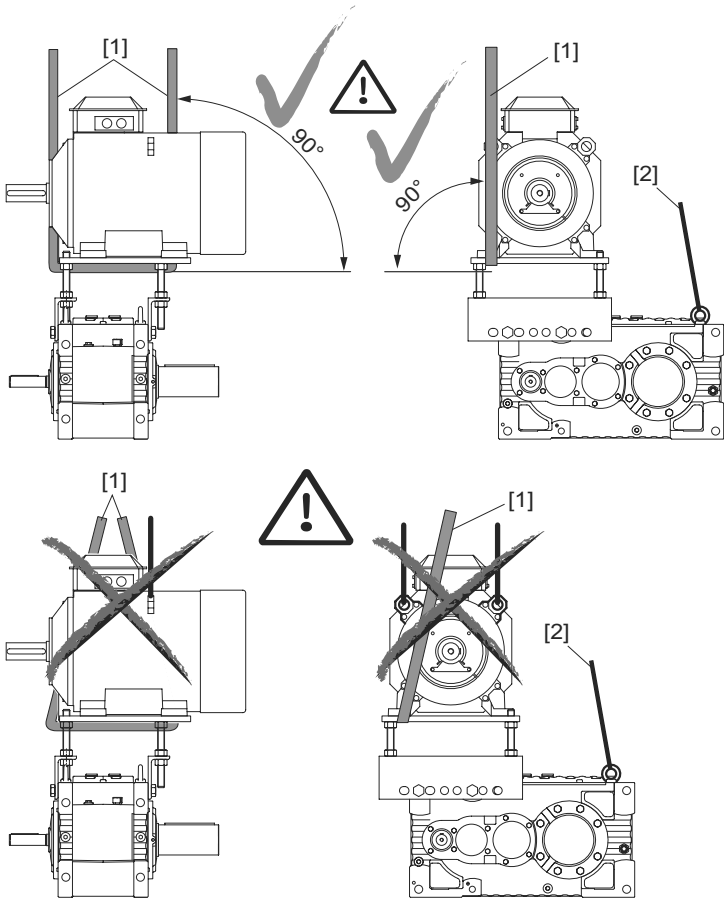

Figure 7: Transport of MC.. with V-belt drive

2.5 Corrosion and surface protection

The information in this chapter is valid for MC units assembled in Europe. For other regions, other painting systems might be applied. Please contact your local SEW-EURODRIVE assembly center for MC.. units.

Introduction

The corrosion and surface protection of gear units comprises the following three basic features:

1. Painting system
   - Standard painting system K7 E160/2
   - High-resistant painting system K7 E260/3 as option
2. Gear unit corrosion protection with
   - interior protection and
   - exterior protection
3. Gear unit packing
   - Standard packing (palette)
   - Wooden box
   - Seaworthy packing

Standard painting system K7 E 160/2

Painting is performed according to TEKNOS EPOXY SYSTEM K7, which is based on the high-solid epoxy paint TEKNOPLAST HS 150.

Two layer system K7 E 160/2	Thickness
• Epoxy primer	60 µm
• Teknoplast HS 150	100 µm
TOTAL	**160 µm**

Color shade: RAL 7031, blue gray

Guards and shields

Powder coating, epoxy-based coat paint (EP) is used for guards and shields.

Layer thickness 65 µm

Color shade: TM 1310 PK, warning in yellow color

High-resistant painting system K7 E 260/3

Painting is performed according to TEKNOS EPOXY SYSTEM K7, which is based on the high-solid epoxy paint TEKNOPLAST HS 150.

Three-layer system, E 260/3	thickness
• Epoxy primer	60 µm
• Teknoplast HS 150	2x100 µm
TOTAL	**260 µm**

Optional color shade

Other color shades are possible on request.

Usage of painting system

Environmental pollution	None	Low	Medium	High	Very high
Typical environmental conditions		Unheated buildings where condensation might occur Atmospheres with low pollution, mostly rural areas	Production rooms with high level of moistureand low air pollution City and industrial atmospheres, moderate pollution with sulphur dioxide, coastal areas with low salt load	Industrial areas and costal areas with moderate salt load Chemical plants	Buildings or areas with almost permanent condensation and high pollution Industrial areas with very high levels of moisture and aggressive atmospheres
Mounting	Indoors	Indoors	Indoors or outdoors	Indoors or outdoors	Indoors or outdoors
Relative humidity	< 90 %	up to 95 %	up to 100 %	up to 100 %	up to 100 %
Recommended painting system	Standard painting system K7 E160/2	Standard painting system K7 E160/2	Standard painting system K7 E160/2	High resistant painting system K7 E260/3	Contact SEW-EURODRIVE

Storage and transport conditions

Industrial gear units of the MC.. series are delivered without oil fill. Different protection systems are required depending on storage period and ambient conditions:

Storage period: up to … months	Storage conditions Gear unit corrosion protection				Transport conditions Gear unit packing	
	OUTDOORS, roofed	INDOORS, heated (0…+20°C)	Storage area close to sea OUTDOORS, roofed	Storage area close to sea INDOORS	Land transport	Sea transport
6	Standard protection	Standard protection	Contact SEW-EURODRIVE	Long-term protection	Standard packing	Seaworthy packing
12	Contact SEW-EURODRIVE	Standard protection	Contact SEW-EURODRIVE	Long-term protection	Standard packing	Seaworthy packing
24	Long-term protection	Contact SEW-EURODRIVE	Contact SEW-EURODRIVE	Long-term protection	Standard packing	Seaworthy packing
36	Contact SEW-EURODRIVE	Long-term protection	Contact SEW-EURODRIVE	Long-term protection	Standard packing	Seaworthy packing

Standard protection / interior

- Gear units undergo a test run with oil. The oil is drained by SEW-EURODRIVE before dispatch. The remaining layer of oil on the inner parts serves as basic protection.

Standard protection / exterior

- Oil seals and seal surfaces are protected by suitable grease.
- Unpainted surfaces (including spare parts) are covered with a protective coating. Before other equipment is mounted to such surfaces, the protective coating must be removed using a solvent.
- Small spare parts and loose pieces, such as screws, nuts, etc., are supplied in corrosion protected plastic bags (VCI corrosion protection bag).
- Threaded holes and blind holes are covered by plastic plugs.
- The breather plug (position → chapter "Mounting Positions") is already installed.

Standard protection / packing

Standard packing is used: The gear unit is delivered on a palette without cover

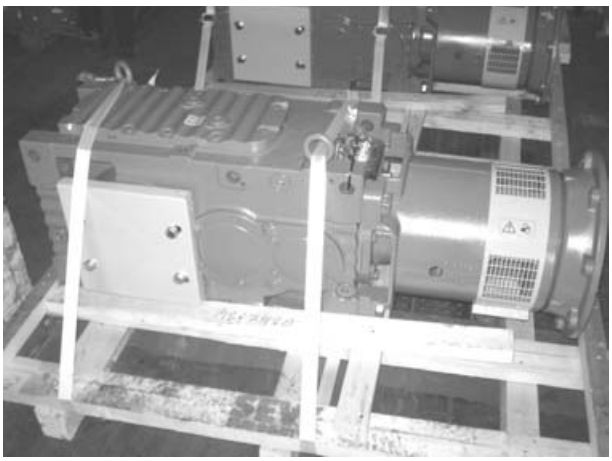

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Figure 8: Standard protection / packing

- **If the gear unit is stored longer than 6 months, it is recommended to regularly check the protective coating of unpainted areas as well as the paint coat. Areas with removed protection coating or paint have to be repainted, if necessary.**
- **The LSS must be rotated at least one turn in such a way that the position of the roller elements in the bearings of LSS and HSS changes. This procedure has to be repeated every 6 months until startup.**

Long-term protection / interior

The following procedure is applied in addition to the "standard protection":

- A VPI solvent is sprayed through the oil filling hole
- The breather plug is replaced with a screw plug (before startup, the screw plug must be replaced again by the breather plug, which is attached to the gear unit separately)

- **Never open the gear unit near open flames, sparks and hot objects because solvent vapors might be ignited.**
- **Take preventive measures to protect people from solvent vapors. It is absolutely crucial that open flames are avoided when the solvent is applied and when the solvent evaporates.**

Long-term protection / exterior

- Oil seals and seal surfaces are protected through suitable grease
- Unpainted surfaces (including spare parts) are covered with a protective coating. Before other equipment is mounted to such surfaces, the protective coating must be removed using a solvent.
- Small spare parts and loose pieces, such as screws, nuts, etc., are supplied in corrosion protected plastic bags (VCI corrosion protection bag).
- Threaded holes and blind holes are covered by plastic plugs
- The breather plug (Position → chapter "Mounting Positions") is already installed.

Long-term protection / packing

- Seaworthy packing is used: The gear unit is packed in a seaworthy plywood box with a wooden frame

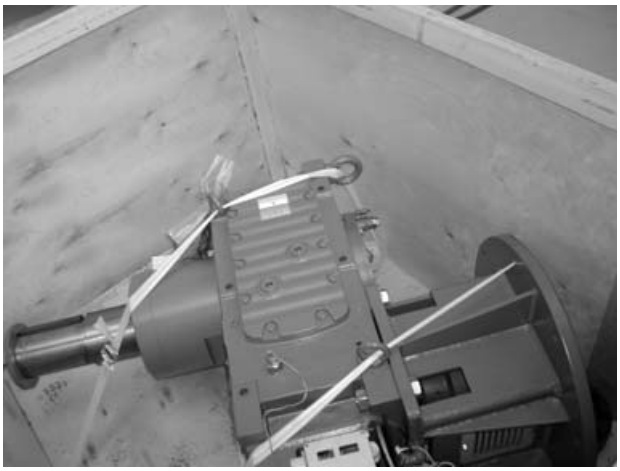

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Figure 9: Long-term protection / packing

- **If the gear unit is stored for longer than 6 months, it is recommended to regularly check the protective coating of unpainted areas as well as the paint coat. Areas with removed protection coating or paint have to be repainted, if necessary.**
- **The LSS must be rotated at least one turn in such a way that the position of the roller elements in the bearings of LSS and HSS changes. This procedure must be repeated every 6 months until startup.**
- **The interior long-term protection with the VPI solvent has to be repeated every 24 / 36 months (according to the table "Storage and transport conditions") until startup**.

Alternative packing

Optionally, the gear unit can be supplied in a wooden box with standard gear unit protection.

3 Gear Unit Design

The following illustrations serve to explain the general design. Their only purpose is to facilitate the assignment of components to the spare parts lists. Discrepancies are possible depending on gear unit size and version!

3.1 Basic design of industrial gear units of the MC..P.. series

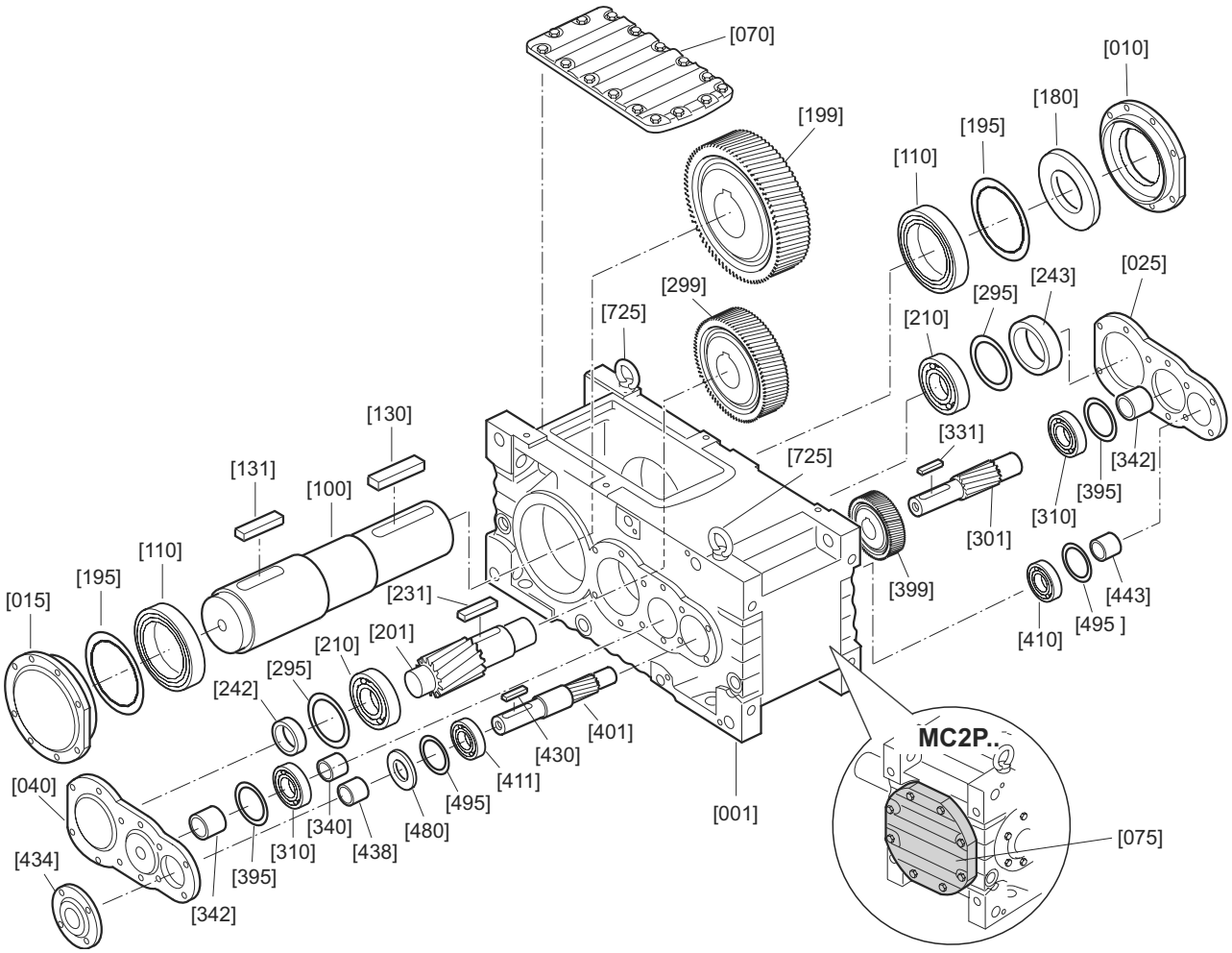


Figure 10: Basic design of industrial gear units of the MC..P.. series

[001] Gear unit housing	[131] Key	[299] Gear wheel	[410] Bearing
[010] Bearing cover	[180] Oil seal	[301] Pinion shaft	[411] Bearing
[015] Bearing cover	[195] Shim	[310] Bearing	[430] Key
[025] Bearing cover	[199] Output gear wheel	[331] Key	[434] Cover
[040] Bearing cover	[201] Pinion shaft	[340] Distance bushing	[438] Bushing
[070] Housing cover	[210] Bearing	[342] Distance bushing	[443] Distance bushing
[075] Assembly cover	[231] Key	[395] Shim	[480] Oil seal
[100] Output shaft	[242] Distance piece	[399] Gear wheel	[495] Shim
[110] Bearing	[243] Distance piece	[401] Input shaft	[725] Lifting eyebolt
[130] Key	[295] Shim		

3.2 Basic design of industrial gear units of the MC..R.. series

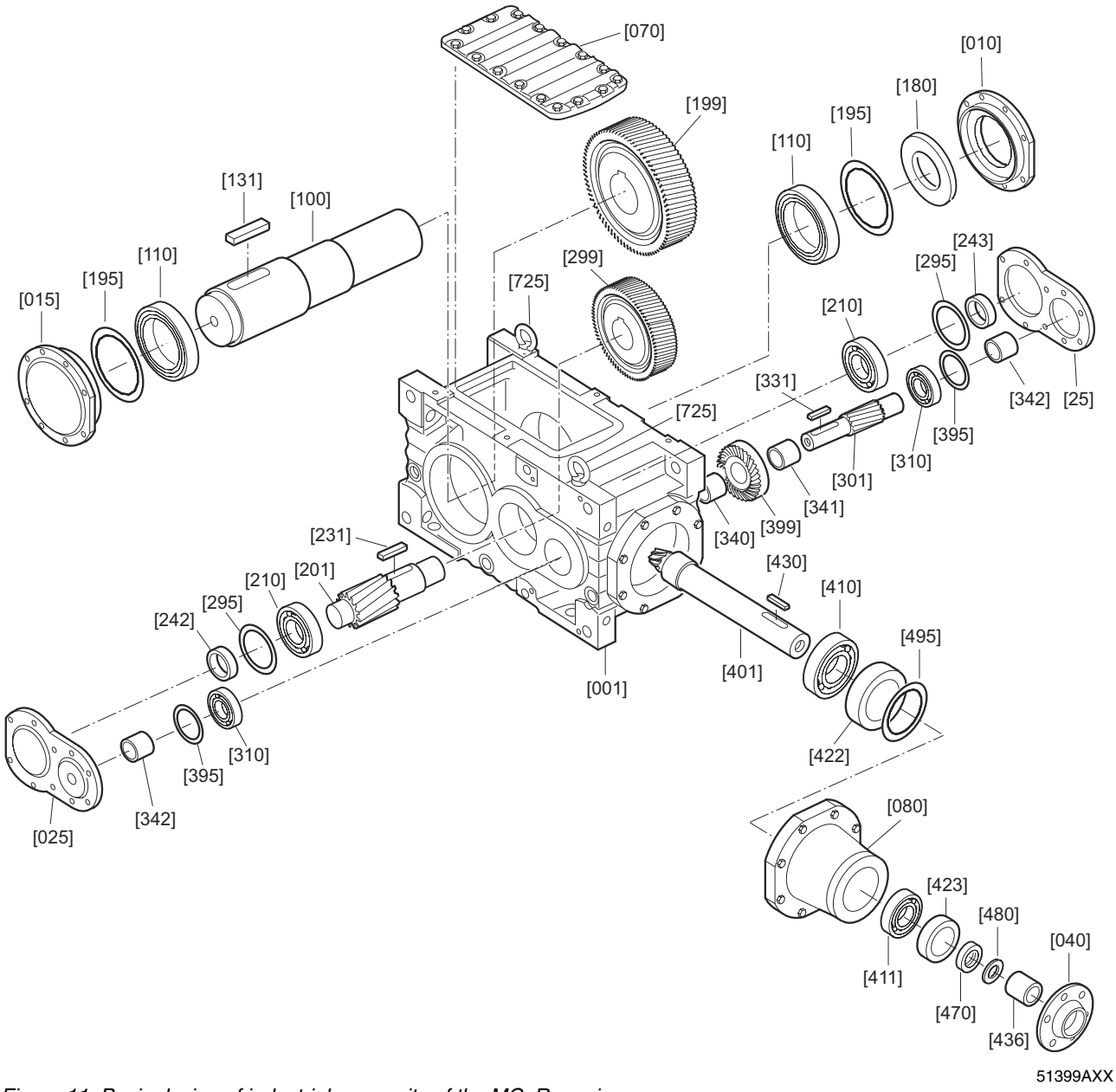
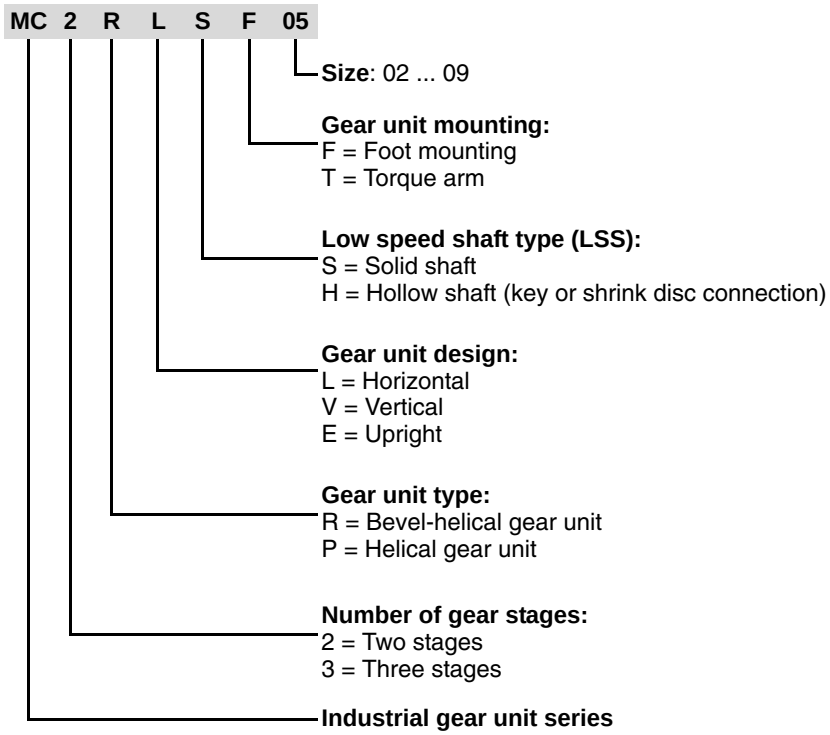


Figure 11: Basic design of industrial gear units of the MC..R.. series

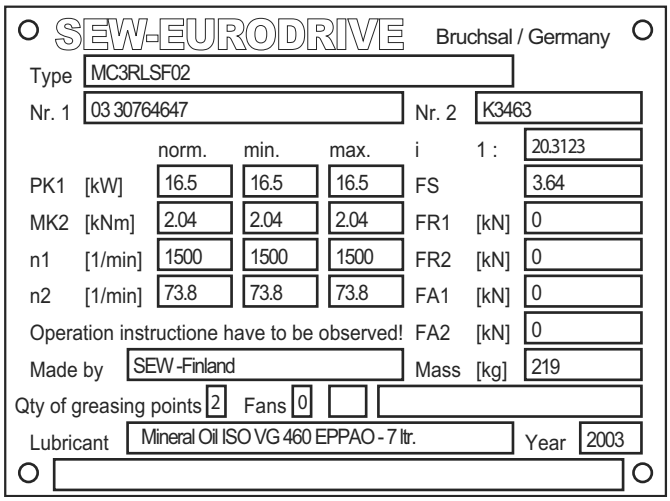
[001] Gear unit housing	[131] Key	[299] Gear wheel	[410] Bearing
[010] Bearing cover	[180] Oil seal	[301] Pinion	[411] Bearing
[015] Bearing cover	[195] Shim	[310] Bearing	[422] Bearing bushing
[025] Bearing cover	[199] Output gear wheel	[331] Key	[423] Bearing bushing
[040] Cover	[201] Pinion shaft	[340] Distance bushing	[430] Key
[070] Housing cover	[210] Bearing	[341] Distance bushing	[436] Sleeve
[080] Bearing cover	[231] Key	[342] Distance bushing	[470] Tightening nut
[100] Output shaft	[242]Distance bushing	[395] Shim	[480] Oil seal
[110] Bearing	[243] Distance bushing	[399] Bevel gear	[495] Shim
[130] Key	[295] Shim	[401] Bevel pinion shaft	[725] Lifting eyebolt

3.3 Unit designation / nameplates

Sample unit designation


MC 2 R L S F 05
Size: 02 ... 09
Gear unit mounting:
F = Foot mounting
T = Torque arm
Low speed shaft type (LSS):
S = Solid shaft
H = Hollow shaft (key or shrink disc connection)
Gear unit design:
L = Horizontal
V = Vertical
E = Upright
Gear unit type:
R = Bevel-helical gear unit
P = Helical gear unit
Number of gear stages:
2 = Two stages
3 = Three stages
Industrial gear unit series

Example: Nameplate of the MC.. series industrial gear unit, SEW-EURODRIVE


SEW-EURODRIVE
Bruchsal / Germany
Type MC3RLSF02
Nr. 1 03 30764647
Nr. 2 K3463
norm. min. max. i 1 : 20.3123
PK1 [kW] 16.5 16.5 16.5 FS 3.64
MK2 [kNm] 2.04 2.04 2.04 FR1 [kN] 0
n1 [1/min] 1500 1500 1500 FR2 [kN] 0
n2 [1/min] 73.8 73.8 73.8 FA1 [kN] 0
Operation instructione have to be observed! FA2 [kN] 0
Made by SEW -Finland Mass [kg] 219
Qty of greasing points 2 Fans 0
Lubricant Mineral Oil ISO VG 460 EPPAO - 7 ltr. Year 2003

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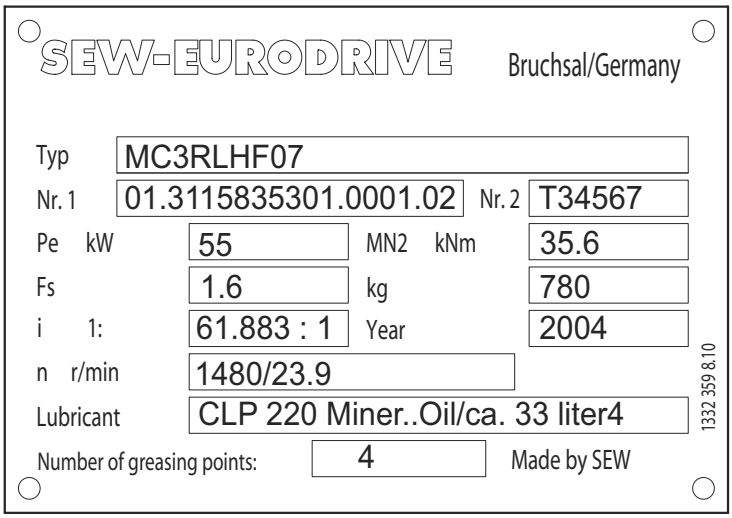
Typ			Unit designation
Nr. 1			Serial number 1: Eurodrive order number (e.g. SAP-order number)
Nr. 2			Serial Number 2: (factory / assembly center manufacturing number)
P_{K1}	norm.	[kW]	Running power on gear unit input @ n_1 norm.
	min.		Running power on gear unit output @ n_1 min.
	max		Running power on gear unit output @ n_1 max.
M_{K2}	norm.	[kNm]	Running torque on gear unit output @ n_1 norm.
	min.		Running torque on gear unit output @ n_1 min.
	max		Running torque on gear unit output @ n_1 max.
n_1	norm.	[1/min]	Input speed (HSS)
	min.		Minimum existing input speed (HSS)
	max		Maximum existing input speed (HSS)
n_2	norm.	[1/min]	Output speed (LSS)
	min.		Minimum existing output speed (LSS)
	max		Maximum existing output speed (LSS)
Made by			Location of gear unit assembly / manufacturing
norm.			normal operation point
min.			minimum operation point
max.			maximum operation point
i			Exact gear unit reduction ratio
F_S			Service factor
F_{R1}		[kN]	Existing radial load on HSS
F_{R2}		[kN]	Existing radial load on LSS
F_{A1}		[kN]	Existing axial load on HSS
F_{A2}		[kN]	Existing axial load on LSS
Mass		[kg]	Gear unit weight

Qty of greasing points:		Number of points that require regreasing (e.g. in case of regreasable labyrinth seals or drywell sealing system)
Fans		Number of cooling fans mounted on gear unit
Lubricant		Oil grade and viscosity class / oil volume
Year		Year of assembly
IM		Mounting Position: Housing orientation and mounting surface
TU		Temperature permitted range of ambient

Example: Nameplate of the MC.. series industrial gear unit, SEW-EURODRIVE



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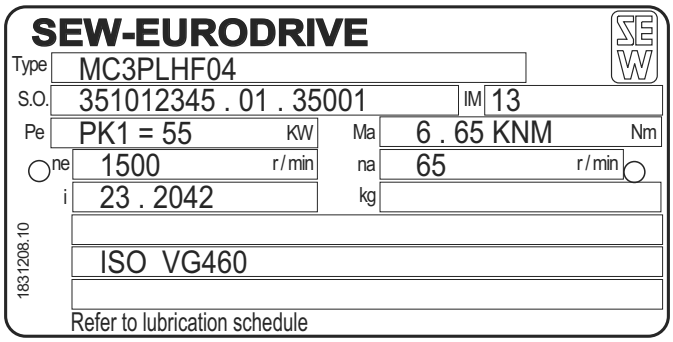
Typ		Unit designation
Nr. 1		Serial number 1
Nr. 2		Serial number 2
P_e	[kW]	Absorbed power on the input shaft
F_S		Service factor
n	[r/min]	Input/output speed
kg		Weight
i		Exact gear unit reduction ratio
Lubricant		Oil grade and viscosity class / oil volume
M_{N2}	[kNm]	Rated torque of the gear unit
Year		Year of manufacture
Number of greasing points		Number of points that require regreasing

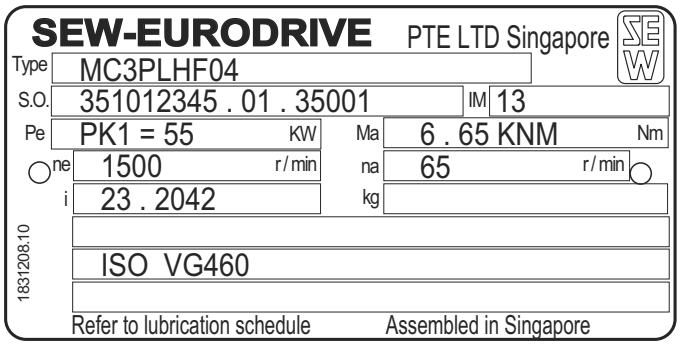
Example: Nameplate of the MC series industrial gear unit, SEW-EURODRIVE China



51965AXX

Type		Unit designation
IM		Shaft position
P_e	[kW]	Absorbed power on the intput shaft
M_a	[Nm]	Output torque on the output shaft
n_e	[r/min]	Input speed
n_a	[r/min]	Output speed
i		Exact gear unit reduction ratio
S.O.		Order number

Example: Nameplate of the MC series industrial gear unit, SEW-EURODRIVE Singapore



51351AXX

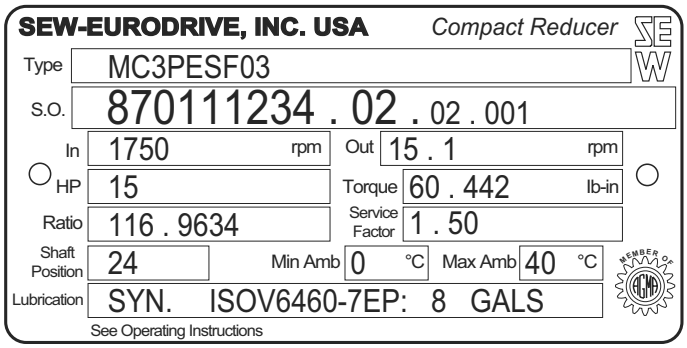
Type		Unit designation
IM		Shaft position
P_e	[kW]	Absorbed power on the intput shaft
M_a	[Nm]	Output torque on the output shaft
n_e	[r/min]	Input speed
n_a	[r/min]	Output speed
i		Exact gear unit reduction ratio
S.O.		Order number

Example: Nameplate of the MC series industrial gear unit, SEW-EURODRIVE Brazil

51598AXX

Typo		Unit designation
No		Order number
P_e	[kW]	Absorbed power on the input shaft
M_a	[Nm]	Output torque on the output shaft
n_e	[rpm]	Input speed
n_a	[rpm]	Output speed
i		Exact gear unit reduction ratio
IM		Shaft position
f_S		Service factor

Example: Nameplate of the MC series industrial gear unit, SEW-EURODRIVE USA



51349AXX

Type		Unit designation
In	[rpm]	Input speed
Out	[rpm]	Output speed
HP	[HP]	Absorbed power on the output shaft
Torque	[lb-in]	Output torque
Ratio		Exact gear unit reduction ratio
Service Factor		Service factor
Shaft Position		Shaft position
Min Amb	[°C]	Minimum ambient temperature
Max Amb	[°C]	Maximum ambient temperature
Lubrication		Oil grade and volume
S.O.		Shop order number

Example: Nameplate of the MC series industrial gear unit, SEW-EURODRIVE Chile

56624AXX

Tipo		Unit designation
N^o		Serial number 1
F.C.		Shaft position
P_e	[kW]	Input power
n_e		Input speed
i		Exact gear unit reduction ratio
f.s.		Service factor
Identif.		Grease type
Tipo Lubr.		Oil grade and viscosity class
Cant Lubt.		Oil quantity
Ma	[Nm]	Gear unit nominal torque
na	[rpm]	Output speed
∅ a	[mm]	LSS shaft diameter
Peso	[Kg]	Weight of gear unit

3.4 Mounting positions

The following features clearly define the mounting position and corresponding design of MC units:

- Mounting surface (F1...F6) → chapter 3.5
- Housing orientation (M1...M6) → chapter 3.6

  In addition, the shaft positions (0...4) have to be defined → chapter 3.7

  The gear designs "horizontal LSS (L)", "vertical LSS (V)", "upright mounting (E)" are associated with the housing orientation

3.5 Mounting surface

Definition

The mounting surface is defined as the surface(s) of the foot or flange mounted gear unit to which the customer's machine is mounted.

Designations

Six different mountings surfaces have been defined (designations "F1" to "F6"):

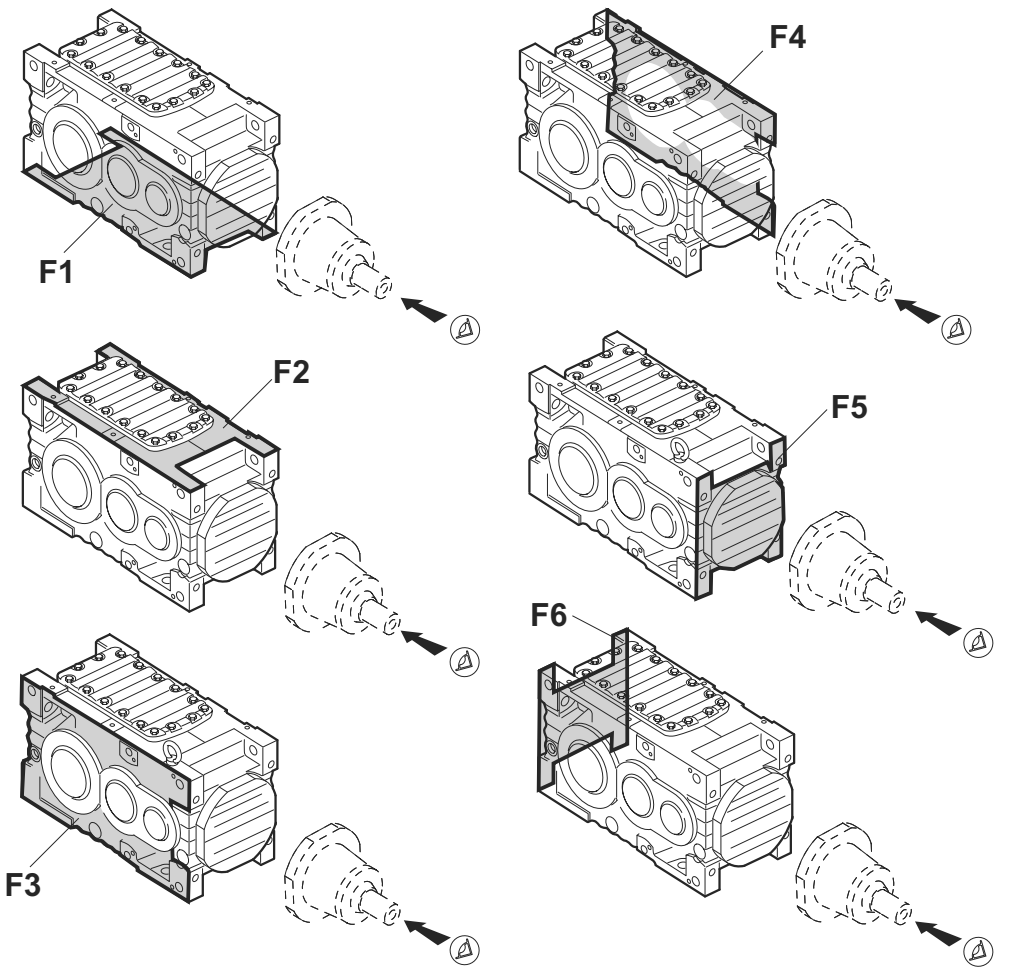


Figure 12: Mounting surface

3.6 Housing orientation M1...M6

The housing orientation is defined as the position of the housing in space and is defined using the designations M1....M6.

Each housing orientation corresponds to a certain

- gear unit design (L, V, E)
- standard mounting surface (F1...F6)

The housing orientation is defined separately for

- **MC.P.. helical units**
- **MC.R.. bevel-helical units**

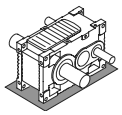
Unless specified otherwise, the **standard correlation** of

- gear unit design and
- housing orientation and
- mounting surface

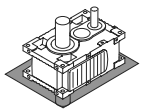
is as follows (foot mounted gear units):

Standard correlation of gear unit design and housing orientation

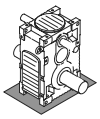
MC..**PL**: M1, F1



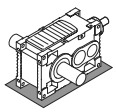
MC..**PV**: M5, F3



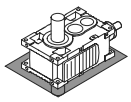
MC..**PE**: M4, F6



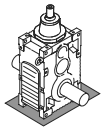
MC..**RL**: M1, F1



MC..**RV**: M5, F3



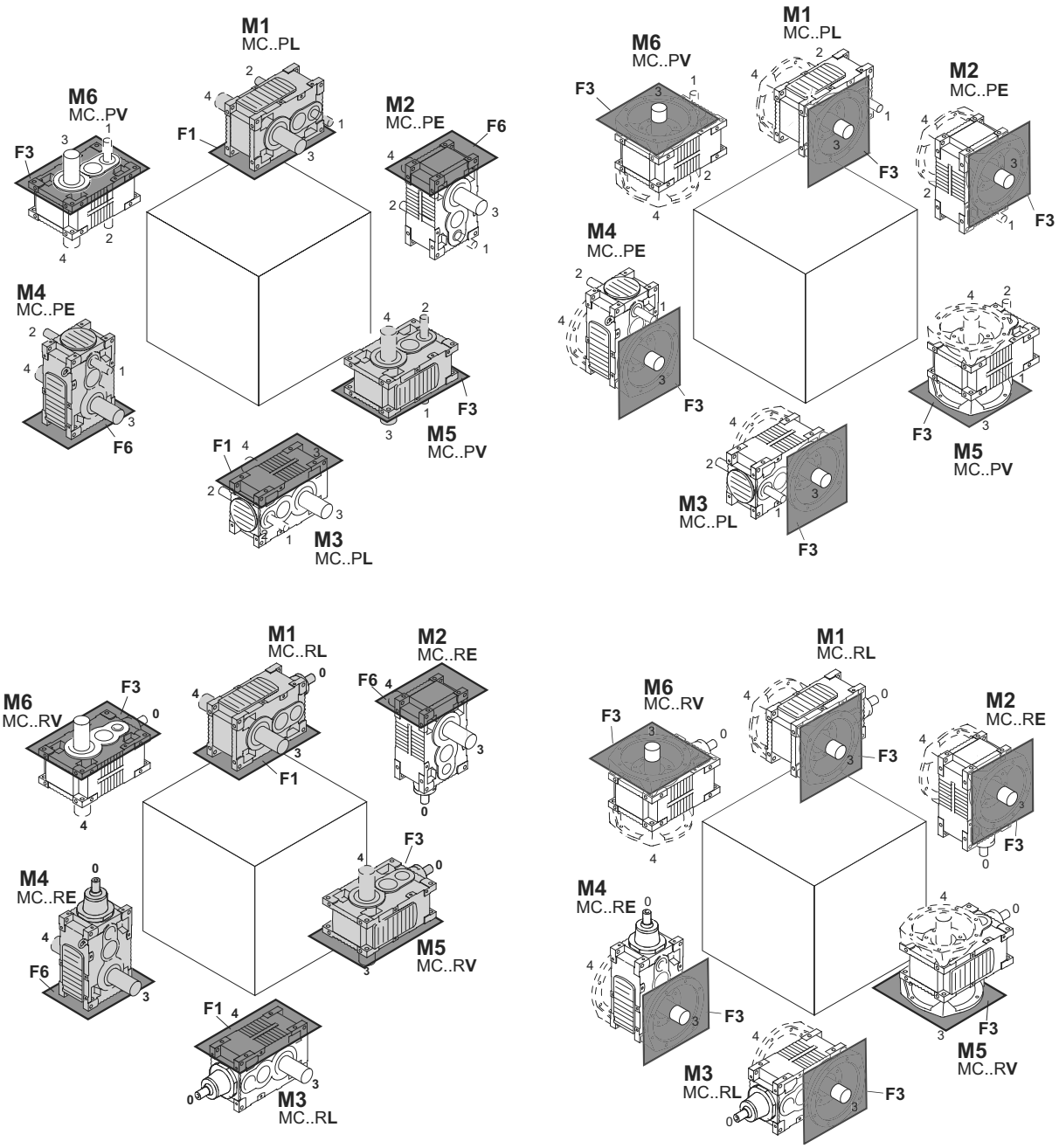
MC..**RE**: M4, F6



For gear units with mounting flange on the LSS, the standard position of the flange depends on the shaft position of the LSS unless specified otherwise:

- Shaft position 3 → LSS mounting flange F3
- Shaft position 4 → LSS mounting flange F4

Housing orientation and standard mounting surface



- The units marked in gray are standard design.
- Other mounting surfaces are possible in conjunction with a certain housing orientation. Please refer to order-specific dimension drawing.

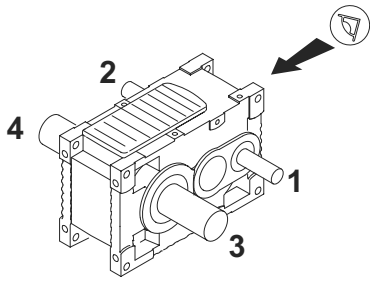
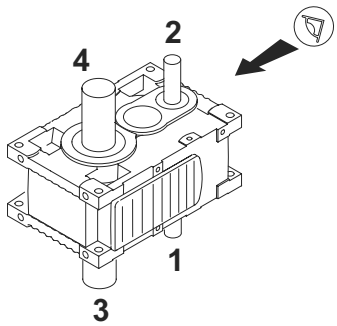
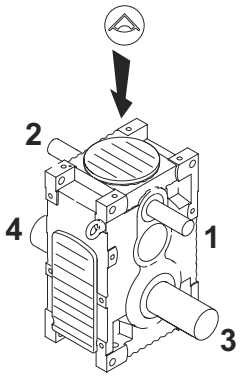
It is not allowed to change the housing orientation and/or mounting surface deviating from the order.

3.7 Shaft positions

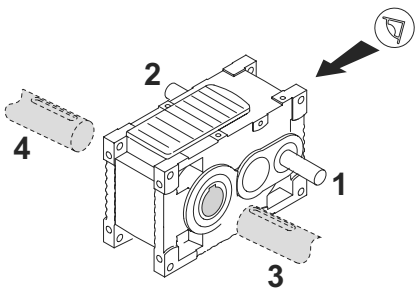
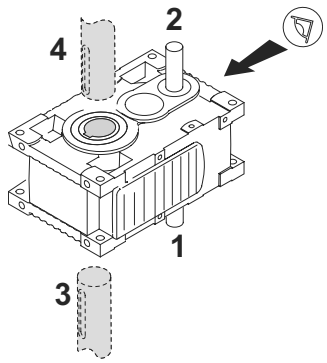
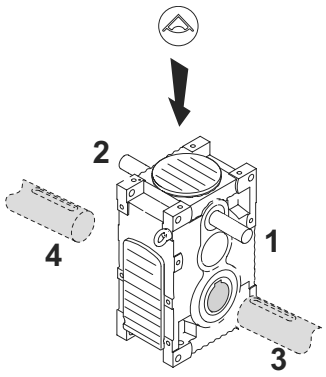
The shaft positions (0, 1, 2, 3, 4) and directions of rotation shown in the following figures apply to output shafts (LSS) of the types **solid shaft and hollow shaft**. For other shaft positions or gear units with backstop, contact SEW-EURODRIVE.

The following shaft positions (0, 1, 2, 3, 4) are possible:

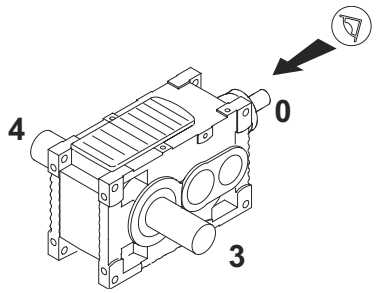
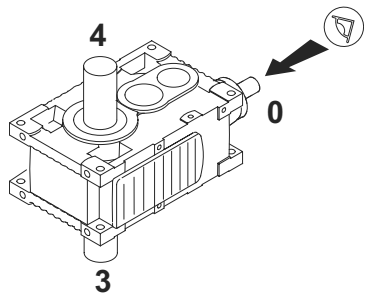
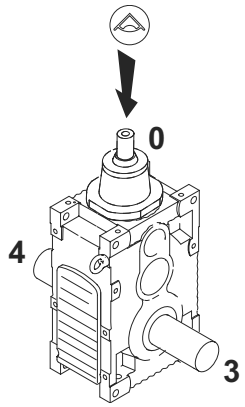
Shaft positions MC.P.S..

Housing orientation		
M1	**M5**	**M4**
Gear unit design		
Horizontal LSS (L)	**Vertical LSS (V)**	**Upright mounted (E)**
		

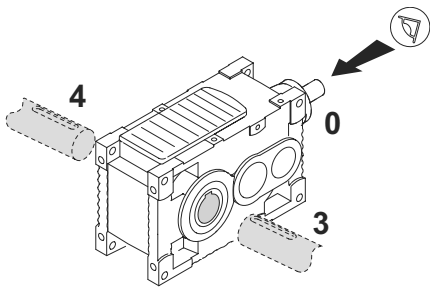
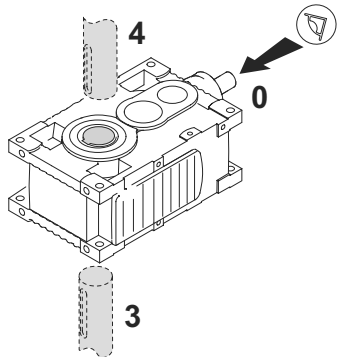
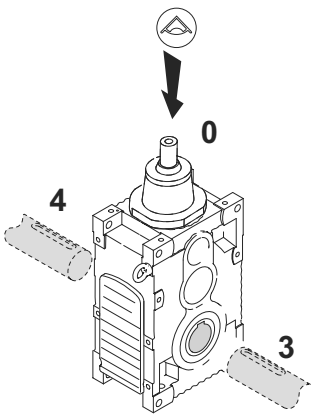
Shaft positions MC.P.H..

Housing orientation		
M1	**M5**	**M4**
Gear unit design		
Horizontal LSS (L)	**Vertical LSS (V)**	**Upright mounted (E)**
		

Shaft positions MC.R.S..

Housing orientation		
M1	**M5**	**M4**
Gear unit design		
Horizontal LSS (L)	**Vertical LSS (V)**	**Upright mounted (E)**
		

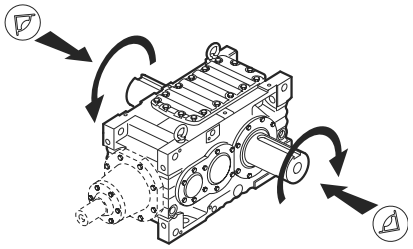
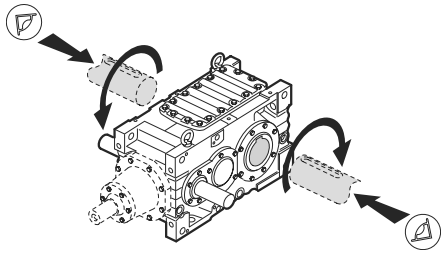
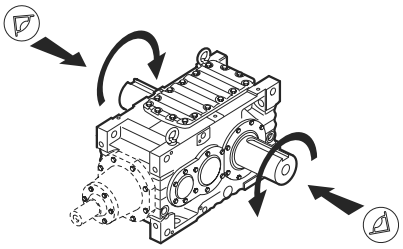
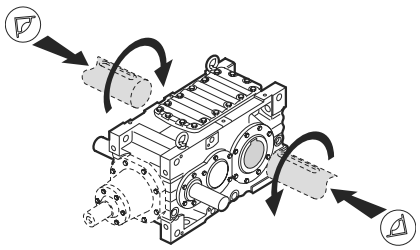
Shaft positions MC.R.H..

Housing orientation		
M1	**M5**	**M4**
Gear unit design		
Horizontal LSS (L)	**Vertical LSS (V)**	**Upright mounted (E)**
		

3.8 Direction of rotation

Directions of rotation

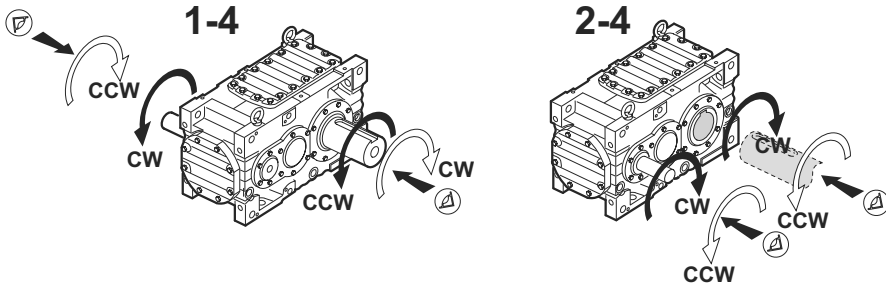
The directions of rotation of the outputs shaft (LSS) are defined as follows:

Direction of rotation	Gear unit version	
	MC.P.S.. MC.R.S..	MC.P.H.. MC.R.H..
Clockwise (CW)	 52036AXX	 51383AXX
Counter-clockwise (CCW)	 52037AXX	 51386AXX

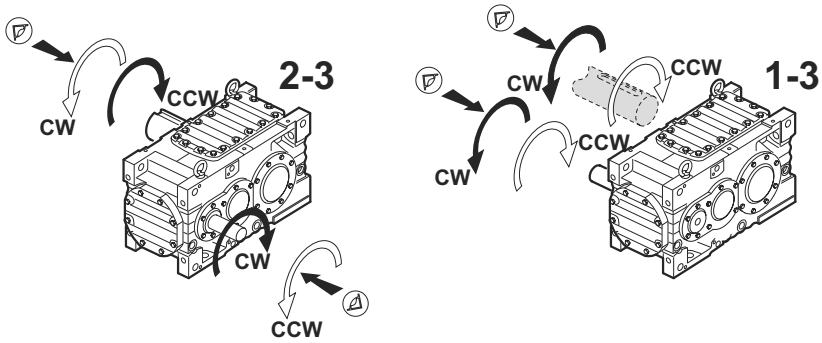
Shaft positions and corresponding directions of rotation of MC2P..

The following figures show shaft positions and corresponding directions of rotation for industrial gear units of the MC2P.. series.

Two stages



51391AXX

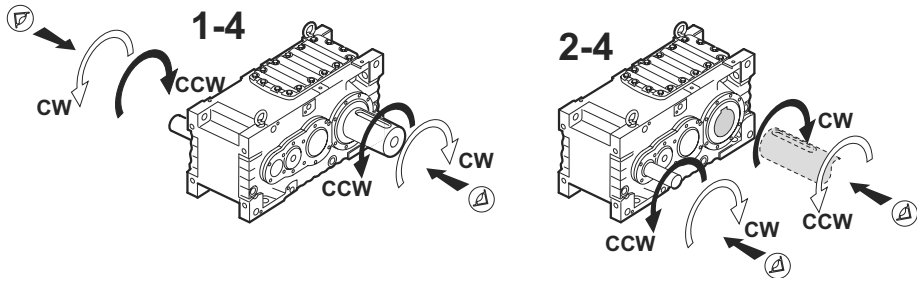


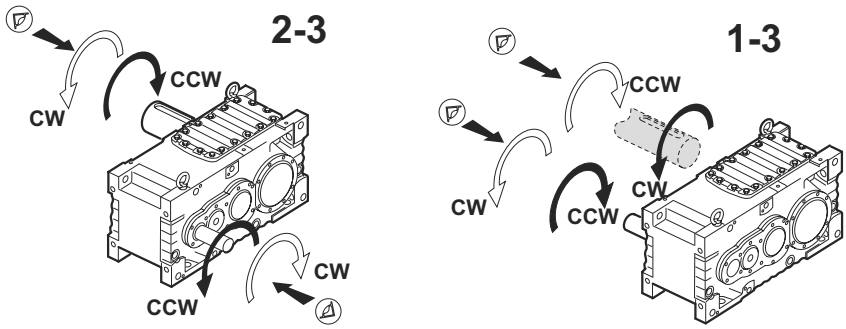
51392AXX

Shaft positions and corresponding directions of rotation of MC3P..

The following figures show shaft positions and corresponding directions of rotation for industrial gear units of the MC3P.. series.

Three stages

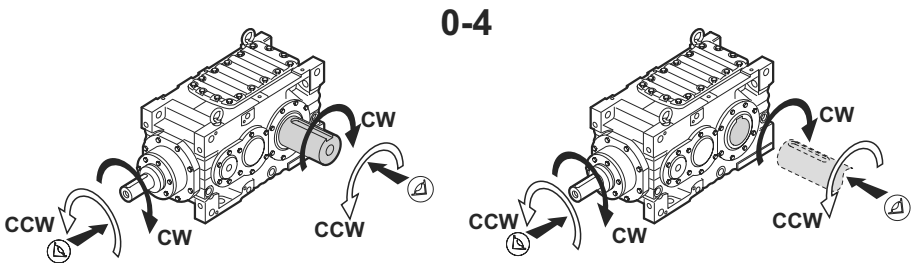


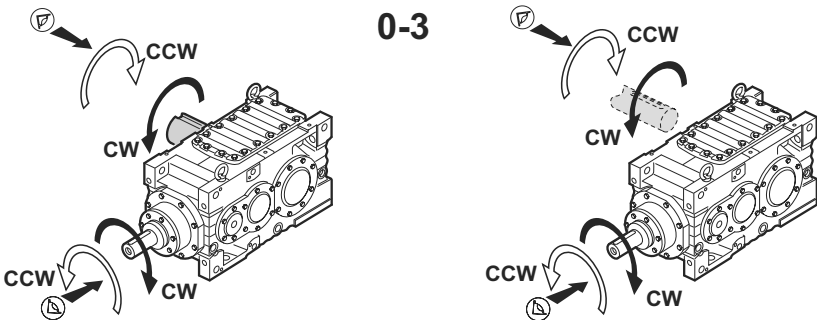


Shaft positions and corresponding directions of rotation of MC.R.. without backstop

The following figures show shaft positions and corresponding directions of rotation for industrial gear units of the MC.R.. two and three stage series without backstop.

Two and three stages

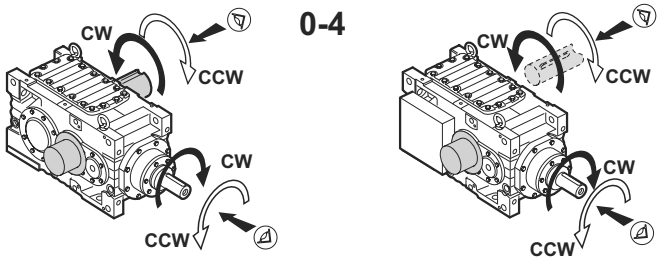




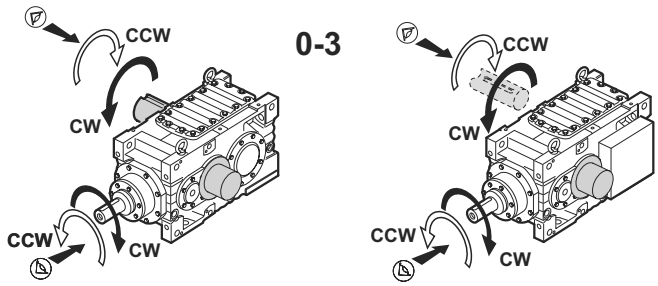
Shaft positions and corresponding directions of rotation of MC2RS.. / MC2RH.. keyway with backstop

The following figures show shaft positions and corresponding directions of rotation for two-stage gear units with backstop of the types MC.RS.. and MC.RH.. with keyway.

Two stages



55950AXX



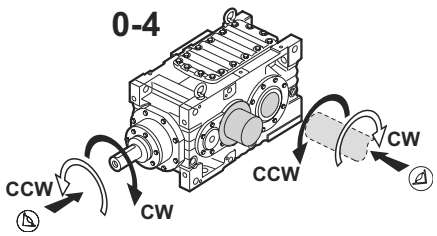
55951AXX

Only one direction of rotation is possible, which has to be defined in the order. The permitted direction of rotation is indicated on the housing.

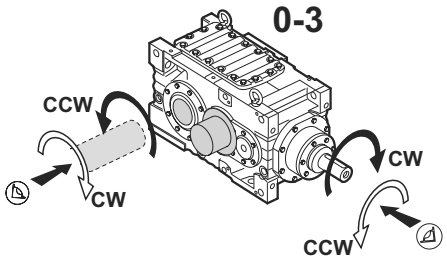
Shaft positions and corresponding directions of rotation of MC2RH.. /SD shrink disc units with backstop

Below figures show shaft positions and corresponding directions of rotation for two-stage gear units with backstop of the type MC.RS.. with shrink disc.

Two stages



55952AXX



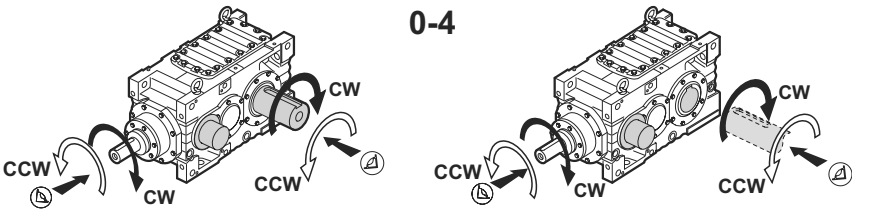
55953AXX

Only one direction of rotation is possible, which has to be specified in the order. The permitted direction of rotation is indicated on the housing.

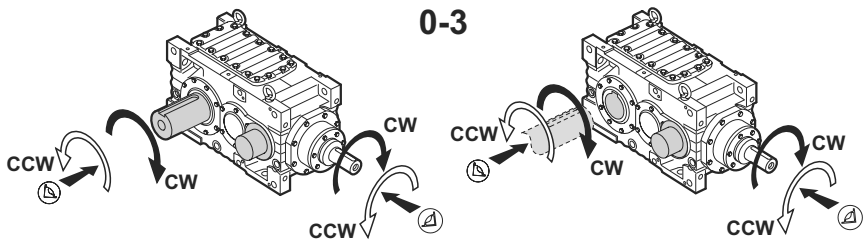
Shaft positions and corresponding directions of rotation of MC3R.. industrial gear units backstop on driven machine end

The following figures show shaft positions and corresponding directions of rotation for MC.RS.. and MC.RH.. units with keyway and backstop.

Three stages



55954AXX



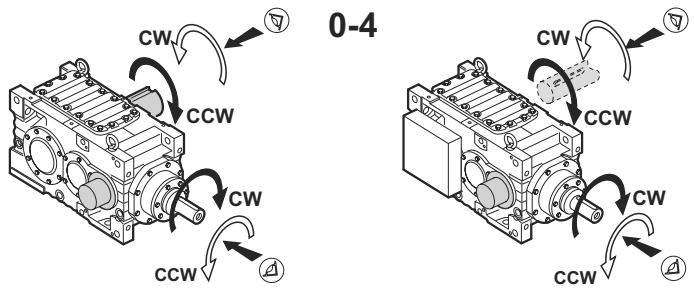
55956AXX

Only one direction of rotation is possible, which has to be specified in the order. The permitted direction of rotation is indicated on the housing.

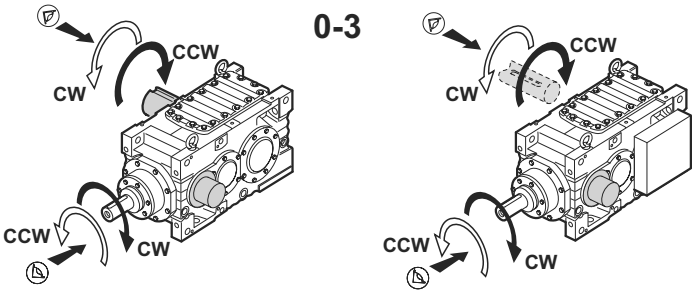
Shaft positions and corresponding directions of rotation of MC3R.. Backstop opposite to driven machine end

The following figures show shaft positions and corresponding directions of rotation for MC.RS.. and MC.RH.. units with keyway and backstop.

Three stages



55957AXX



55958AXX

Only one direction of rotation is possible, which has to be specified in the order. The permitted direction of rotation is indicated on the housing.

3.9 Lubrication of industrial gear units

Depending on the **mounting position**, the **lubrication types "splash lubrication" or "bath lubrication"** are used for industrial gear units of the MC.. series.

Splash lubrication

Splash lubrication is used for industrial gear units of the MC.. series in horizontal mounting position (unit designation MC..**L**..). With splash lubrication, the oil level is low. With this lubrication method, oil is splashed onto the bearings and gearing components.

Oil bath lubrication

Oil bath lubrication is used for industrial gear units of the MC.. series in horizontal mounting position (unit designation MC..**V**..) and upright mounting position (unit designation MC..**E**..) With oil bath lubrication, the oil level is so high that the bearings and gearing components are completely submerged in the lubricant.

Oil expansion tanks are **always** used for industrial gear units of the MC.PV.., MC.RV.. and MC.RE.. series with **oil bath lubrication. Oil expansion tanks allow the lubricant to expand when the gear unit heats up during operation.**

Disregarding the mounting position, a steel oil expansion tank is used when the unit is installed outdoors and when the ambient conditions are very humid. This tank can be used both for the version with solid shaft and hollow shaft. A membrane in the oil expansion tank separates the oil in the gear unit from the humid ambient air and thus ensures that no humidity can build up in the gear unit.

Symbols used

The following table shows which symbols are used in the subsequent figures and what they mean.

Symbol	Meaning
	Breather plug
	Inspection opening
	Oil dipstick
	Oil drain plug
	Oil filling plug
	Oil sight glass
	Air outlet screw

Oil bath lubrication upright mounting position

The steel oil expansion tank [6] is used for industrial gear units of the **MC series in upright mounting position** (unit designation **MC.PE..** or **MC..RE..**).

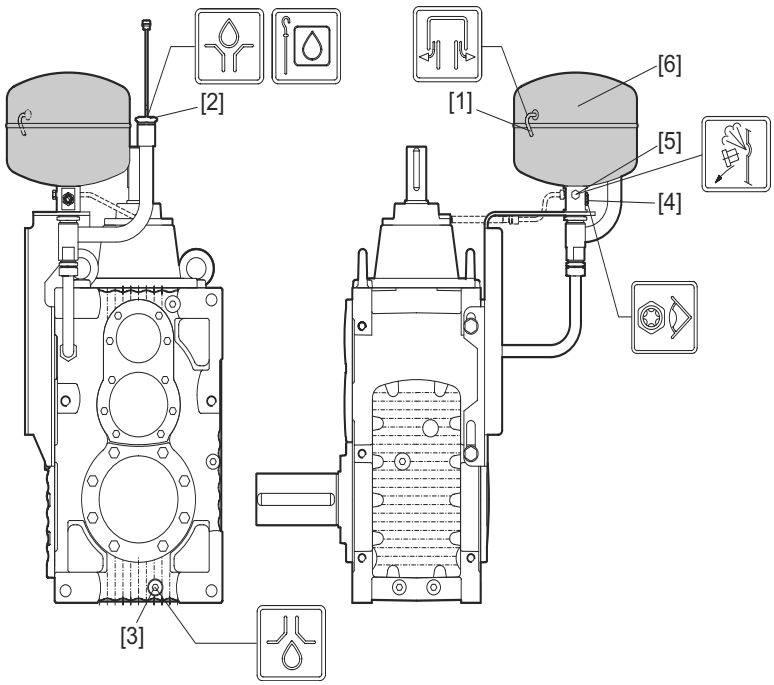


Figure 13: MC.PE../MC.RE.. industrial gear units with steel oil expansion tank

[1] Breather	[4] Oil sight glass
[2] Oil dipstick	[5] Air outlet screw
[3] Oil drain plug	[6] Steel oil expansion tank

Oil bath lubrication vertical mounting position

The steel oil expansion tank [6] for industrial gear units of the **MC series in vertical mounting position** (unit designation **MC.PV.. / MC.RV..**) is located on the side of the assembly cover.

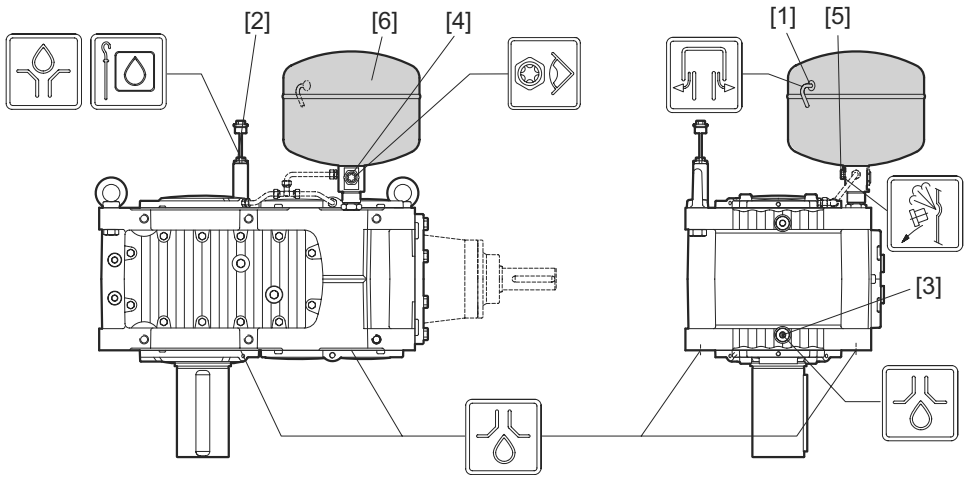


Figure 14: MC.PV../MC.RV.. industrial gear unit with steel oil expansion tank

[1] Breather
[2] Oil dipstick
[3] Oil drain plug
[4] Oil sight glass
[5] Air outlet screw
[6] Steel oil expansion tank

In **dry environmental conditions**, a **cast iron oil expansion tank** [1] is used. This oil expansion tank is only used for the vertical mounting position with the **solid output shaft pointing downwards** (unit designation MC.P**VSF**.. or MC.R**VSF**..).

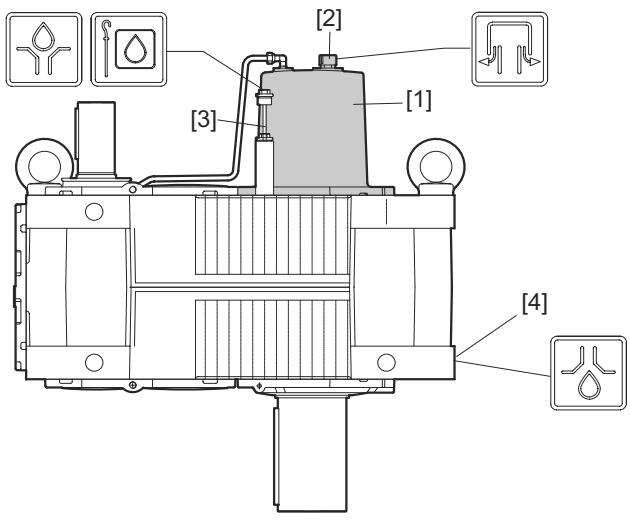


Figure 15: MC.PVSF../MC.RVSF.. industrial gear unit with cast iron oil expansion tank

[1] Cast iron oil expansion tank
[2] Breather plug
[3] Oil dipstick
[4] Oil drain plug

Pressure lubrication

If requested, pressure lubrication is possible as lubrication method **disregarding the mounting position**.

With pressure lubrication, the oil level is low. For sizes 04 to 09, the gearing components and bearings not submerged in the oil bath are lubricated through a shaft end pump (→ Sec. "Shaft end pump"), or, with sizes 02 to 09, through a motor pump (" Sec. → Motor pump").

The lubrication method "pressure lubrication" is used when

- oil bath lubrication is not desired for upright or vertical mounting positions
- input speeds are very high
- the gear unit must be cooled by an external oil/water (→ Sec. "Oil/water cooling system") or oil/air cooling system (→ Sec. "Oil/air cooling system")

For more details on oil expansion tanks, refer to Sec. "Mounting Positions".

4 Mechanical Installation

4.1 Required tools / resources

Not included in the scope of delivery:

- Wrench set
- Torque wrench (for shrink discs)
- Motor attachment to motor adapter
- Mounting device
- Shims and spacing rings if necessary
- Fasteners for input and output elements
- Lubricant (e.g. NOCO® fluid from SEW-EURODRIVE)
- For hollow shaft gear units (→ Sec. "Mounting/removal of hollow shaft gear units with keyed connection): Threaded rod, nut (DIN 934), retaining screw, ejector screw
- Securing components according to Sec. "Gear unit foundation"

Installation tolerances

Shaft end	Flanges
Diametric tolerance in accordance with DIN 748 • ISO k6 for solid shafts with ∅ ≤ 50 mm • ISO m6 for solid shafts with ∅ > 50 mm • ISO H7 for hollow shafts for shrink disc • ISO H8 for hollow shafts with keyway • Center hole in accordance with DIN 332, shape DS..	Centering shoulder tolerance: • ISO js7 / H8

4.2 Before you begin

The drive may only be installed if

- the data on the nameplate of the motor match the supply voltage
- the drive is not damaged (no damage resulting from transport or storage) and
- the following requirements have been properly met:
  - **with standard gear units:**
    ambient temperature according to the lubricant table in Sec. "Lubricants" (see standard), no oil, acid, gas, vapors, radiation, etc.
  - **with special versions:**
    drive configured in accordance with the ambient conditions (→ order documents)

4.3 Preliminary work

Output shafts and flange surfaces must be completely free of anti-corrosion agents, contamination or other impurities (use a commercially available solvent). Do not let the solvent get in contact with the sealing lips of the oil seals:danger of damage to the material!

4.4 Gear unit foundation

Foundation for foot-mounted gear units

To ensure quick and successful mounting, the type of foundation should be correctly selected and the mounting carefully planned in advance. Foundation drawings with all necessary construction and dimension details should be available.

SEW-EURODRIVE recommends foundation methods shown in the following figures. A customer's own foundation method must be equally adequate.

When mounting a gear unit onto steel framework, special attention should be paid to the rigidity of this framework to prevent destructive vibrations and oscillations. The foundation must be dimensioned according to weight and torque of the gear unit by taking into account the forces acting on the gear unit.

Example 1

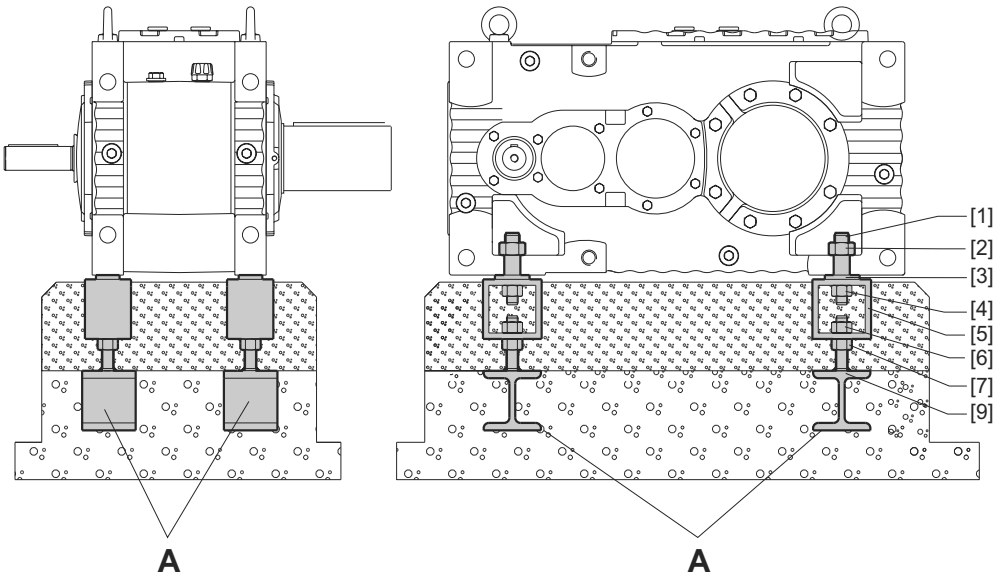


Figure 16: Reinforced concrete foundation for MC.PL.. / MC.RL.. industrial gear units

Pos. "A" → Sec. "Concrete base"

[1] Hex head screw or stud

[2] Hex nut if [1] is a stud or an upside-down screw

[3] Shims (about 3 mm space for shims)

[4] Hex nut

[5] Foundation bracket

[6] Hex nut

[7] Hex nut and foundation screw

[9] Supporting girder

Example 2

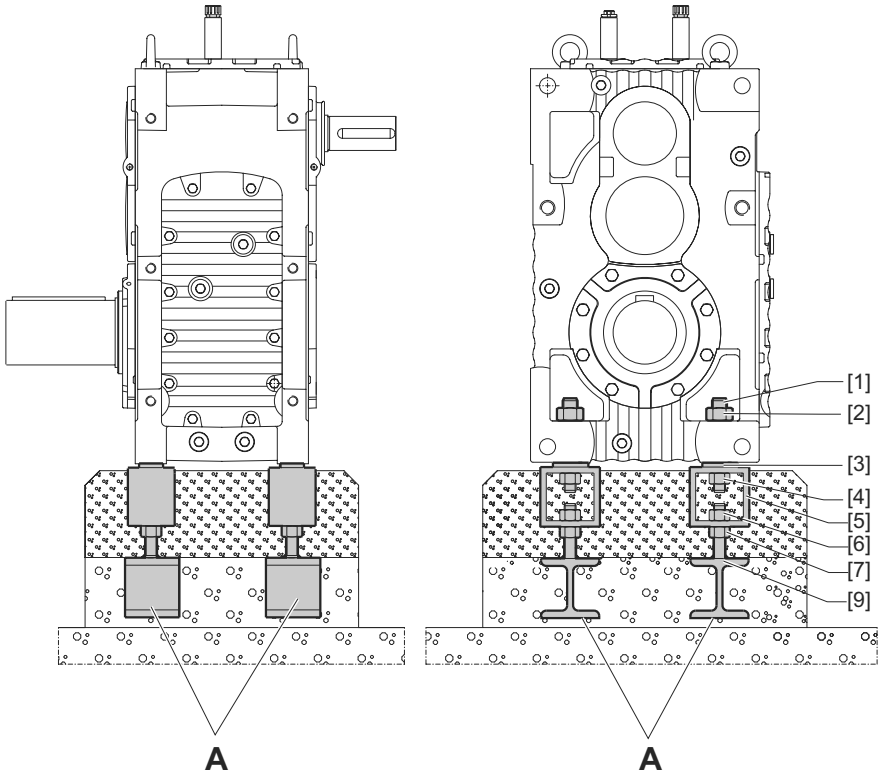


Figure 17: Reinforced concrete foundation for MC.PE.. / MC.RE.. industrial gear units

Pos. "A" → Sec. "Concrete base"

[1] Hex head screw or stud
[2] Hex nut if [1] is a stud or an upside-down screw
[3] Shims (about 3 mm space for shims)
[4] Hex nut
[5] Foundation bracket
[6] Hex nut
[7] Hex nut and foundation screw
[9] Supporting girder

Example 3

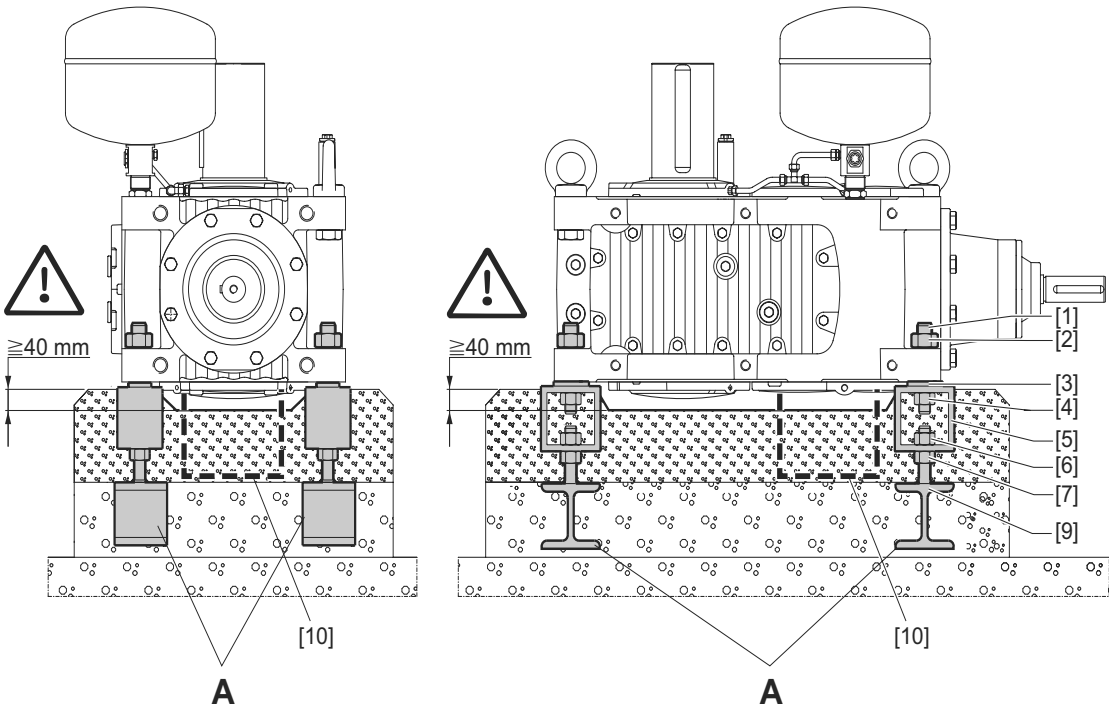


Figure 18: Reinforced concrete foundation for MC.PV.. / MC.RV.. industrial gear units

Pos. "A" → Sec. "Concrete base"

[1] Hex head screw or stud
[2] Hex nut if [1] is a stud or an upside-down screw
[3] Shims (about 3 mm space for shims)
[4] Hex nut
[5] Foundation bracket
[6] Hex nut
[7] Hex nut and foundation screw
[9] Supporting girder
[10] Shaft end pump (optional)

STOP

Important for MC.PV.. / MC.RV.. gear unit types:

- **The mounting clearance between bearing cover and gear unit foundation must be at least 40 mm.**
- **The mounting clearance must be dimensioned adequately if the gear unit is equipped with a shaft end pump [10] (→ Sec. "Shaft end pump")**

Concrete base

The concrete base for the gear unit must be reinforced and interlocked with the concrete using steel clamps, steel rods or steel elements. Only the supporting girders are embedded in the concrete (Pos. "A" → following figure).

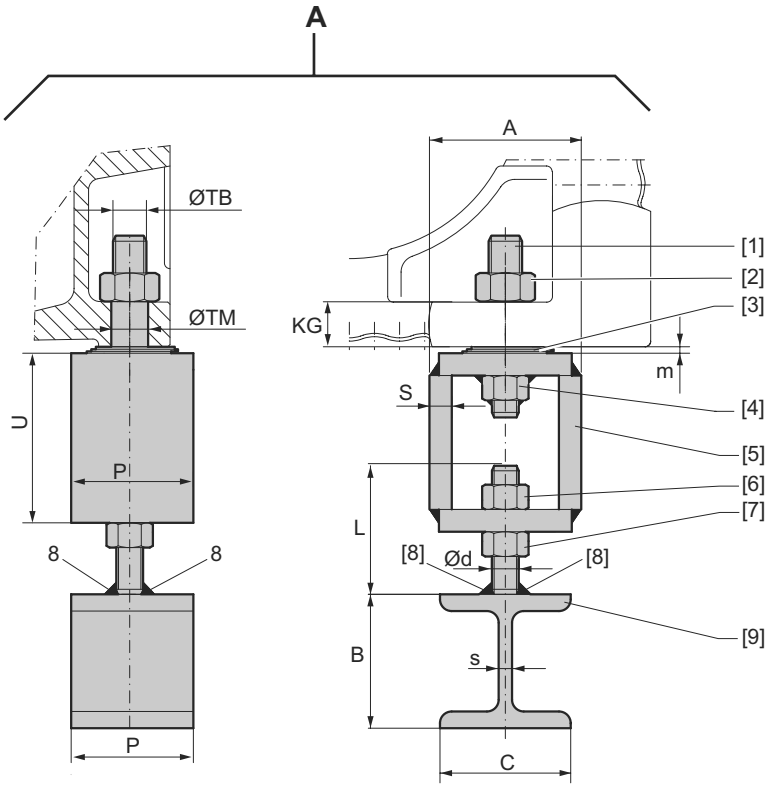


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Figure 19: Reinforcing the concrete base (Pos. "A")

[1] Hex head screw or stud
[2] Hex nut if [1] is a stud or an upside-down screw
[3] Shims (about 3 mm space for shims)
[4] Hex nut
[5] Foundation bracket
[6] Hex nut
[7] Hex nut and foundation screw
[8] Weld seam
[9] Supporting girder

Dimensions

Gear unit size	Stud			Foundation frame					Foundation screws		Supporting girders			
	∅TB	∅TM	KG	m	P	U	A	S	∅d	L	P	B	C	s
	[mm]													
02	M20	24	28	3	120	120	120	20	M24	120	120	100		10
03														
04	M24	28	34											
05														
06	M30	33	40			150		30	M30	150		140		12
07														
08	M36	39	52											
09														

The minimum tensile strength of the supporting girders and foundation screws must be at least 350 N/mm^2.

Grouting

The density of the grout must be equal to that of the base concrete. The grout is connected with the concrete base using concrete reinforcement steel.

Before welding the weld seams [9], ensure that

- the concrete base around the supporting girder has dried
- the gear unit with all mount-on components has been aligned to its final position

Tightening torques

Screw / nut	Tightening torque screw / nut [Nm]
M8	19
M10	38
M12	67
M16	160
M20	315
M24	540
M30	1090
M36	1900

Counterflange for flange mounted gear units

Gear units can be supplied with a mounting flange on the LSS. Dependent on the bearing configuration, the two flange types are called

- "Mounting flange"
- "EBD-Mounting flange"

Basically, both flange types are possible for all gear unit designs and mounting positions:

- MC.L..
- MC.V..
- MC.E..

Mounting flange

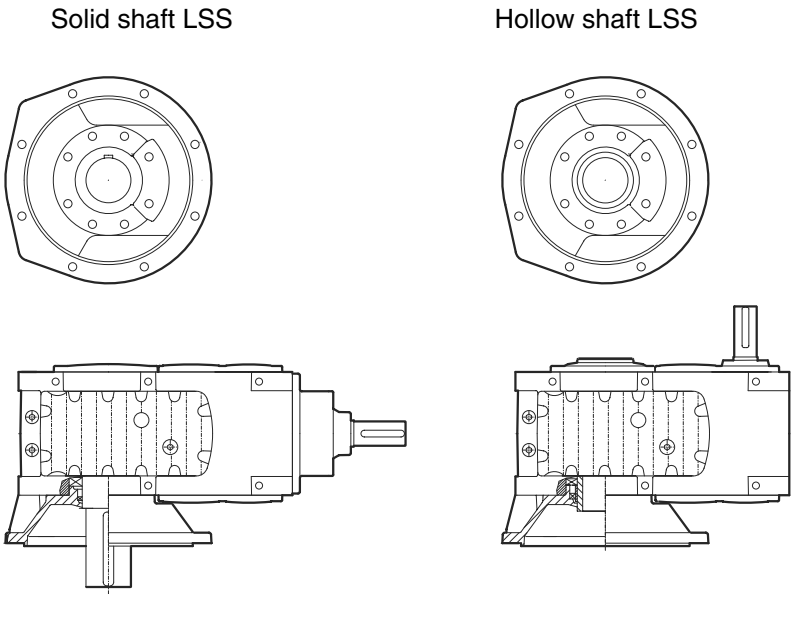

Figure 20: Mounting flange

EBD-Mounting flange

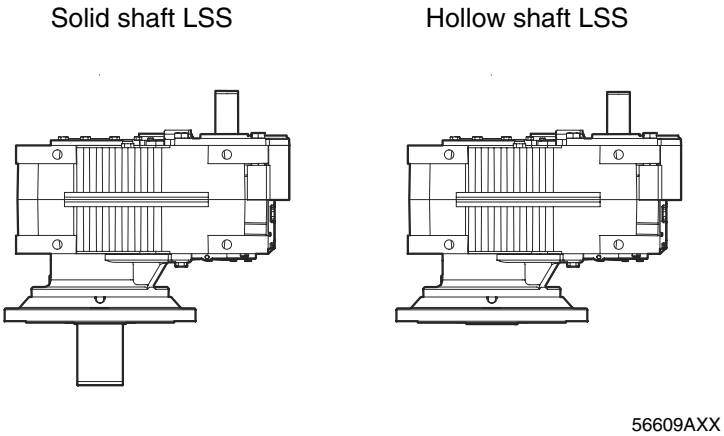

Figure 21: EBD-Mounting flange

The counterflange must have following characteristics:

- Stiff and torsionally rigid, taking into consideration
  - gear unit weight
  - motor weight
  - the torque that has to be transmitted
  - additional forces acting on the gear unit from the customer machine (e.g. axial forces from and towards gear unit from a mixing process)
- Horizontal
- Plain
- Vibration isolating, that means no vibrations are to be transmitted from close-by machines and elements
- Not creating resonance vibrations
- A bore with H7-fitting suiting to the centering shoulder of the gear unit flange according to dimension drawing

The mounting surface of mounting flange and counter flange must be absolutely free of grease or oil and from other contamination (e.g. small textile particles, dust,….)

The alignment of the gear unit LSS in relation to the counterflange has to be as accurate as possible This has an effect on the lifetime of bearing, shafts and coupling.

Allowable misalignments for the coupling on the LSS can be seen in chapter 5.2 or in a separate coupling manual.

Following bolts of the 8.8-class should be used (Tensile strength 640 N/mm^2)

Gear unit size MC..	Mounting flange	EBD-Mounting flange
02	8 x M16	16 x M16
03	8 x M16	16 x M16
04	8 x M16	16 x M16
05	8 x M20	16 x M16
06	8 x M20	16 x M20
07	8 x M20	16 x M20
08	8 x M24	16 x M24
09	8 x M24	16 x M24

4.5 Mounting of solid shaft gear units

Before mounting the gear unit, check the foundation dimensions with those in the corresponding drawings in Sec. "Gear unit foundation."

Mount the gear unit in the following order:

1. Mount the components according to Sec. "Gear unit foundation". The shims [3] facilitate later adjustment and, if necessary, to mount a replacement gear unit.
2. Secure the gear unit at the selected positions on the supporting girders using three foundation screws. Position the foundation screws at maximum possible distance (two screws on one side of the gear unit and one on the other side). Align the gear unit as follows:
   - vertically by lifting, lowering or tilting the unit using the nuts of the foundation screws
   - horizontally by tapping the foundation screws slightly into the required direction
3. After having aligned the gear unit, tighten the three nuts of the foundation screws used for alignment. Carefully insert the fourth foundation screw into the supporting girder and tighten it securely. When doing so, make sure that the position of the gear unit does not change. If necessary, realign the gear unit.
4. Tack-weld the ends of the foundation screws to the supporting girders (at least three welding spots per foundation screw). Tack-weld the foundation screws alternately in both directions (starting from the middle) on each side of the center line of the gear unit. This way, misalignment caused by the welding process is avoided. After having tack-welded all screws, they must be welded all the way round in the above mentioned order. Adjust the nuts on the foundation screws to ensure that the welded foundation screws do not twist the gear unit housing.
5. After having tack-welded the nuts of the retaining screws of the gear unit, check the mounting and carry out grouting.
6. When the grouting concrete has set, check the mounting a last time and adjust, if necessary.

Mounting accuracy when aligning

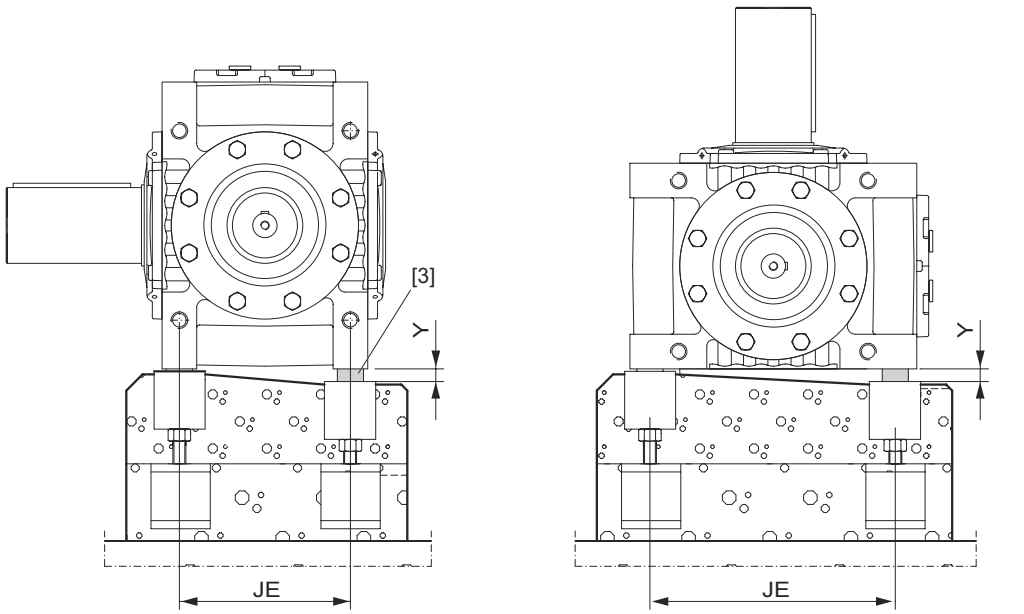

Figure 22: Mounting tolerances of the foundation

When aligning the gear unit, make sure that the mounting tolerances for the evenness of the foundation are not exceeded (values y_{max} in below table). If necessary, use shims [3] to align the gear unit on the foundation plate.

JE [mm]	y_{max} [mm]
< 400	0.035
400 ... 799	0.060
800 ... 1200	0.090
1200 ... 1600	0.125

Flange mounted gear units

Before mounting the gear unit, check if the counterflange fullfils the requirements mentioned in Sec. "4.4 Gear unit foundation - Counterflange for flange mounted gear units"

Mount the gear unit in the following order:

1. Lower the gear unit on the counterflange with suitable lifting means. Especially take care of the guidelines mentioned in Sec. 2.1.
2. Secure the gear unit at the right position on the counterflange using the flange bolts and tighten them crosswise with the full tightening torque (→ sec. 4.4).

4.6 Mounting / removing hollow shaft gear units with keyed connection

- Included in the scope of delivery (→ Figure 23):
  - Circlips [3], end plate [4]
- **Not** included in the scope of delivery (→ Figure 23 / Figure 24 / Figure 25):
  - Threaded rod [2], nut [5], retaining screw [6], ejector screw [8]

Selecting the adequate thread and length of the threaded rod as well as the retaining screw depends on the design of the customer's machine.

Thread sizes

SEW-EURODRIVE recommends the following thread sizes:

Gear unit size	Thread size for • threaded rod [2] • nut (DIN 934) [5] • retaining screw [6]
02 - 06	M24
07 - 09	M30

The thread size of the ejector screw depends on the end plate [4]:

Gear unit size	Thread size of ejector screw [8]
02 - 06	M30
07 - 09	M36

Mounting the hollow shaft gear unit onto the customer's shaft

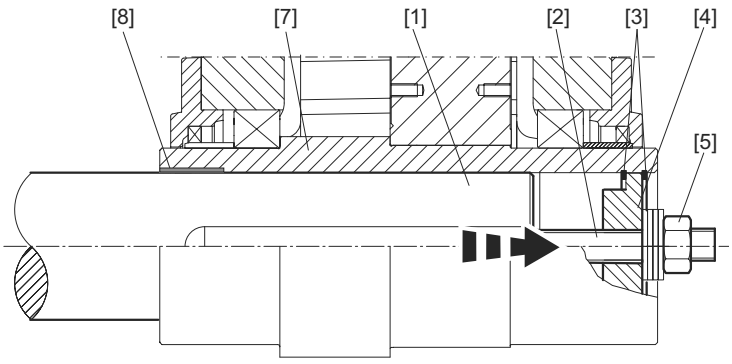

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Figure 23: Mounting of hollow shaft gear unit with keyed connection

[1] Customer's shaft
[2] Threaded rod
[3] Circlips
[4] End plate
[5] Nut
[7] Hollow shaft
[8] Bushing

- To mount and secure the gear unit, attach the circlips [3] and the end plate [4] on the hollow shaft bore.

- Apply NOCO® fluid to the hollow shaft [7] and the shaft end of the customer's shaft [1].
- Push the gear unit onto the customer's shaft [1]. Thread the threaded rod [2] into the customer's shaft [1]. Tighten the customer's shaft [1] with the nut [5] until the shaft end of the customer's shaft [1] and the end plate [4] meet.
- Loosen the nut [5] and unscrew the threaded rod [2]. After having mounted the gear unit, secure the customer's shaft [1] using the retaining screw [6].

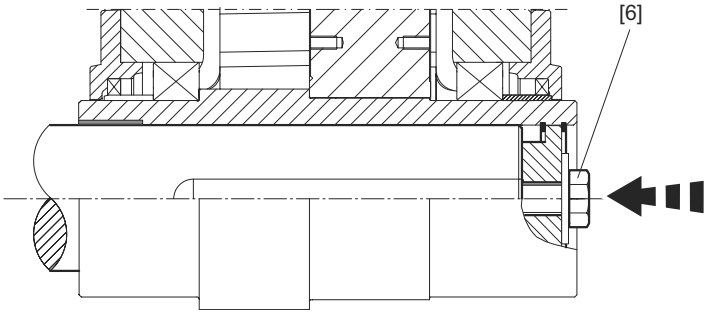

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Figure 24: Mounted hollow shaft gear unit with keyed connection

Removing the hollow shaft gear unit from the customer's shaft

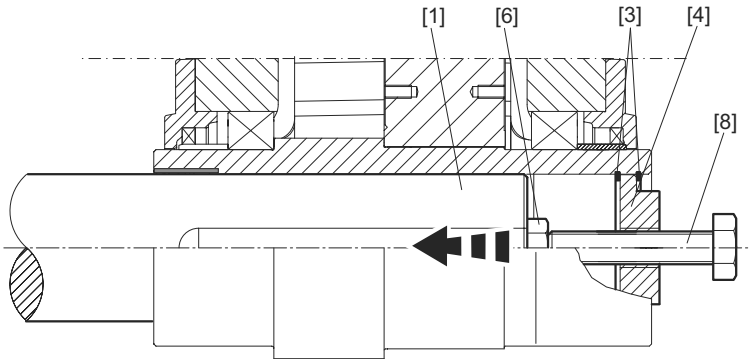

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Figure 25: Removing hollow shaft gear unit with keyed connection

[1] Customer's shaft
[3] Circlips
[4] End plate
[6] Retaining screw
[8] Ejector screw

- Remove the retaining screw [Figure 24, Pos. 6].
- Remove the outer circlip [3] and the end plate [4].
- Thread the retaining screw [6] into the customer's shaft [1].
- Flip the end plate [4] and remount the end plate and the outer circlip [3].
- Thread the ejector screw [8] into the end plate [4] to remove the gear unit from the customer's shaft [1].

4.7 Mounting / removing hollow shaft gear units with shrink disc

A shrink disc serves as connecting element between the hollow shaft of the gear unit and the customer's shaft. For the shrink disc type used (designation: RLK608), refer to section "Identifying shrink disc type"

- Included in the scope of delivery (→ Figure 31):
  - Circlip [3], end plate [4]
- **Not** included in the scope of delivery (→ Figure 31 / Figure 32 / Figure 35):
  - Threaded rod [2], nut [5], retaining screw [6], ejector screw [8]

Selecting the appropriate thread and length of the threaded rod as well as the retaining screw depends on the design of the customer's machine.

Thread sizes

SEW-EURODRIVE recommends the following thread sizes:

Gear unit size	Thread size for • threaded rod [2] • nut (DIN 934) [5] • retaining screw [6] → Figure 32, 33
02 - 06	M24 M30
07 - 09	

The thread size of the ejector screw depends on the end plate [4]:

Gear unit size	Thread size of the ejector screw [8]
02 - 06	M30
07 - 09	M36

Identifying shrink disc type

Normally, the shrink disc type RLK608 is used. It has a metallic colour shade. The letters "RLK 608-…" are engraved:

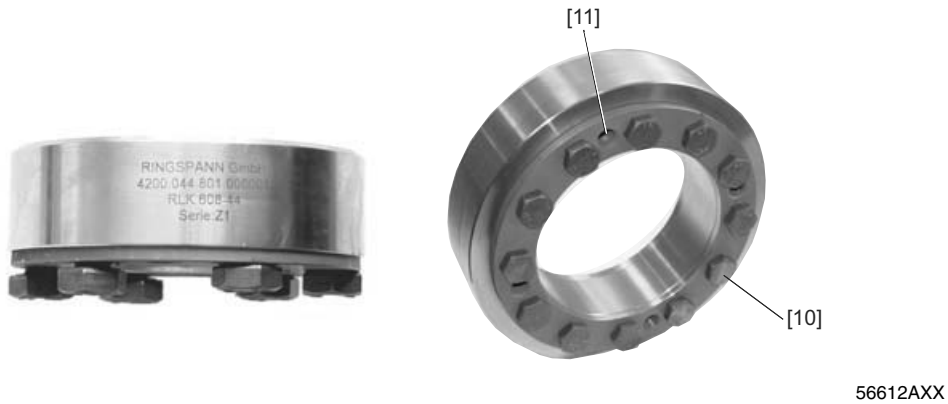

Figure 26: shrink disc type RLK608

[10] Locking screw

[11] Forcing thread

Order-specific, other shrink disc types could be used. In this case please refer to the separate, shrink disc-specific manual.

Mounting the shrink disc

- Do not tighten the locking screws [10] before the customer's shaft [1] has been mounted, else the hollow shaft could be deformed!

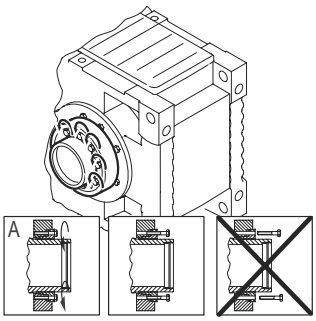

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Figure 27: Shrink disc locking screws before customer's shaft mounting

- Slide the shrink disc [9] with untightened screws onto the hub of the hollow shaft bore. Position the customer's shaft [1] in the hollow shaft bore. Next move the shrink disc [9] by dimension A (→ following figure, Sec. "Dimension A") from the shaft end of the hollow shaft:

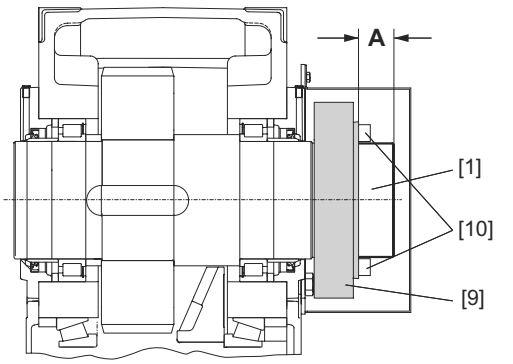

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Figure 28: Mounting the shrink disc

[1] Customer's shaft
[10] Locking screws
[9] Shrink disc

It is essential to make sure that the clamping area of the shrink disc is free from grease.

Dimension A

Gear unit size MC..	Shrink disc type RLK608 Dimension A [mm]
02	39
03	45
04	44
05	42
06	44
07	50
08	51
09	49

Mounting the hollow shaft gear unit onto the customer's shaft

- Before mounting the gear unit, degrease the hollow shaft bore and the customer's shaft [1].

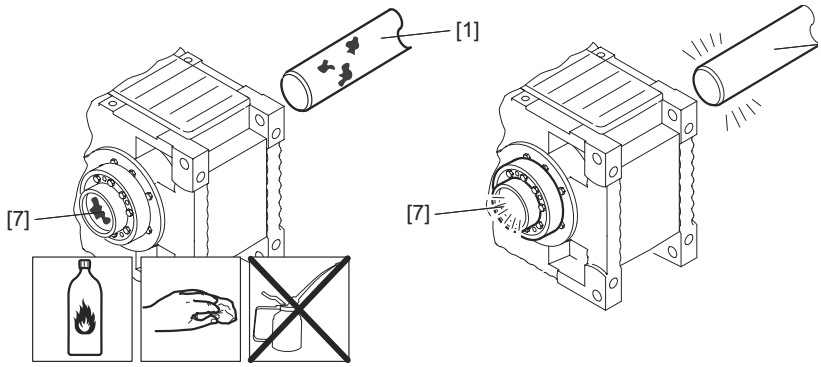

Figure 29: Degrease of hollow shaft bore and customer's shaft

- Apply a small amount of NOCO® fluid on the customer's shaft to the area of the bushing [11].

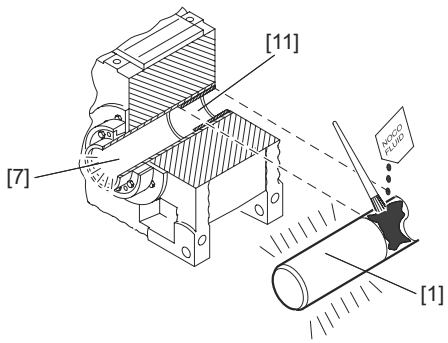

Figure 30: Application of NOCO® fluid on customer's shaft

Never apply NOCO® fluid directly to the bushing as the paste may be able to get into the clamping area of the shrink disk when the input shaft is put on.

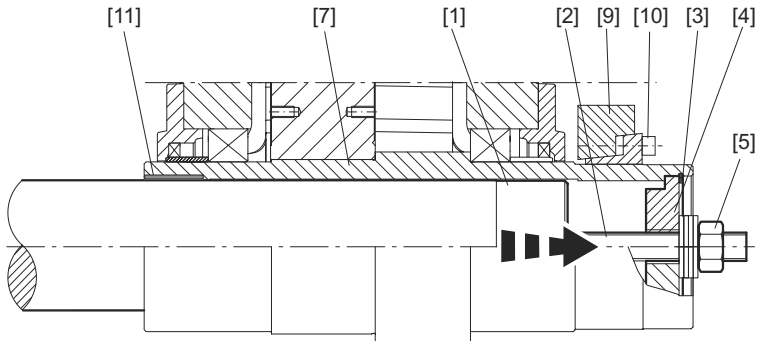

Figure 31: Mounting of hollow shaft gear unit with shrink disc

[1] Customer's shaft
[2] Threaded rod
[3] Circlip
[4] End plate
[5] Nut
[7] Hollow shaft
[9] Shrink disc
[10] Locking screws
[11] Bushing

- To mount and secure the gear unit, attach the circlips [3] and the end plate [4] on the hollow shaft bore.
- Push the gear unit onto the customer's shaft [1]. Thread the threaded rod [2] into the customer's shaft [1]. Tighten the customer's shaft [1] with the nut [5] until the shaft end of the customer's shaft [1] and the end plate [4] meet.
- Loosen the nut [5] and unscrew the threaded rod [2]. After having mounted the gear unit, secure the customer's shaft [1] using the retaining screw [6].

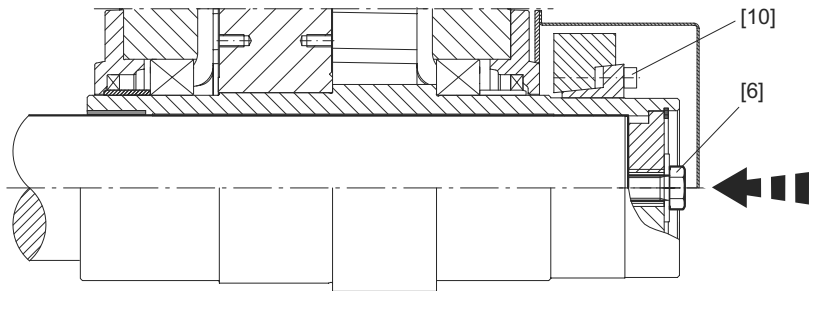

Figure 32: Mounted hollow shaft gear unit with shrink disc, shrink disc unclamped

Tightening shrink disc type RLK608

Tighten the locking screws by hand whilst aligning the shrink disc. Tighten the clamping screws one by one in a clockwise direction (not crosswise) by only 1/4 revolution each.

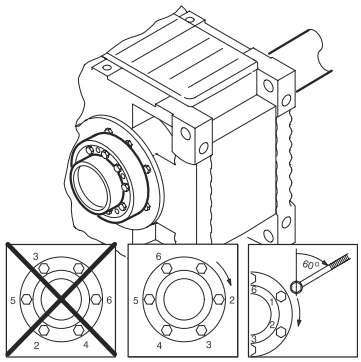

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Figure 33: Order of locking screws thightening

The screws of shrink discs with slitted cone bushing has to be tightened in that way that you start with the screw on one side of the slit and continue with the screw on the other side of the slit.

Continue thighten the screws by 1/4 revolution in several stages until the screw- side faces of the outer ring and the inner ring are in line like shown in Figure 34.

The assembly is defined by the axial movement of the cone bushing and can be done without a torque wrench.

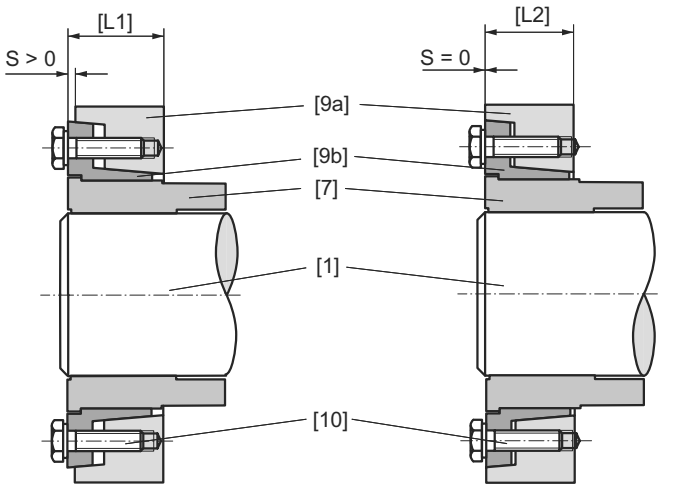

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Figure 34: Tightening shrink disc type RLK608

[L1] State at time of delivery (pre assembled)
[L2] Ready for operation (final assembly)
[9a] Cone
[9b] Cone bushing
[7] Hollow shaft
[1] Customer's shaft
[10] Locking screws

Removing the shrink disc

Loosen the locking screws [10] by 1/4 revolution each in sequence in several levels evenly, so that tilting of the clamping surface is avoided.

Never unscrew the locking screws completely from the tapped hole, since otherwise danger of accident exists.

If the cone bushing and cone ring do not loosen from each other by themselves:

Take the required quantity of locking screws and bolt them evenly into the removing thread bores. Tighten the locking screws in several levels until the cone bushing is separated from the cone ring.

Take the shrink disc off from the hollow shaft.

Removing the hollow shaft gear unit from the customer's shaft

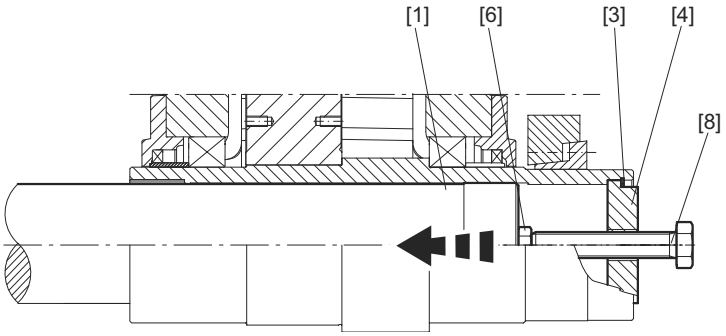


Figure 35: Removing the hollow shaft gear unit with shrink disc connection

[1] Customer's shaft
[3] Circlip
[4] End plate
[6] Retaining screw
[8] Ejector screw

- Remove the retaining screw [Figure 32, Pos. 6].
- Remove the outer circlip [3] and the end plate [4].
- Thread the retaining screw [6] into the customer's shaft [1].
- Flip the end plate [4] and remount the end plate and the outer circlip [3].
- Thread the ejector screw [8] into the end plate [4] to remove the gear unit from the customer's shaft [1].

Cleaning and lubrication

Clean the shrink disk after the disassembly and

- grease afterwards the locking srews [10] on the thread and under the head with paste which consist MoS_2, e.g. "gleitmo 100" from FUCHS LUBRITECH (www.fuchs.-lubritech.de).
- Coat the conical surfaces and the screw-side face of the cone bushing with a thin film (0.01 ... 0.02 mm) with the solid film lubricant "gleitmo 900" from FUCHS LUBRITECH (www.fuchs.-lubritech.de) or with an equal product from other supplier.

Spray the solid film lubricant on the surface till the color of the solid film lubricant is just thick enough to cover the surface (in this case the thickness will be about 0.01 ... 0.02 mm)

4.8 Mounting a motor with motor adapter

Motor adapters [1] are available for mounting IEC motors of sizes 132 to 315 to industrial gear units of the MC series.

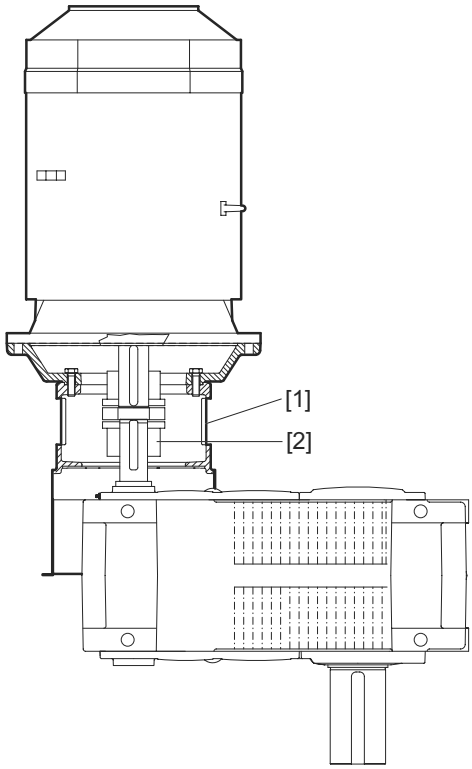


Figure 36: Motor adapter for MC.P.. industrial gear units

[1] Motor adapter

[2] Coupling

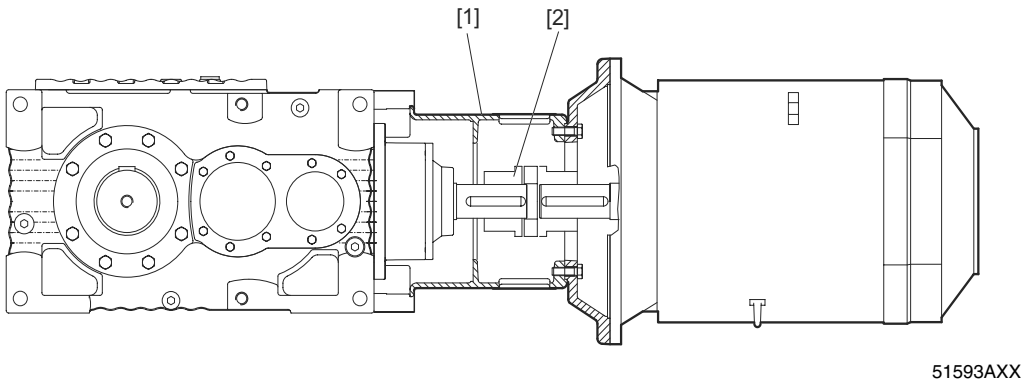


Figure 37: Motor adapter for MC.R.. industrial gear units

[1] Motor adapter

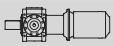
[2] Coupling

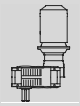
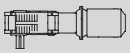
For mounting couplings [2], refer to the notes in Sec. "Mounting of couplings."

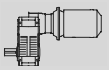
When selecting a motor, **take into account the** permitted **motor weight**, the **gear unit design** and the **type of gear unit mounting** according to the following tables.

The following applies to all tables:

G_M = Motor weight G_G = Gear unit weight

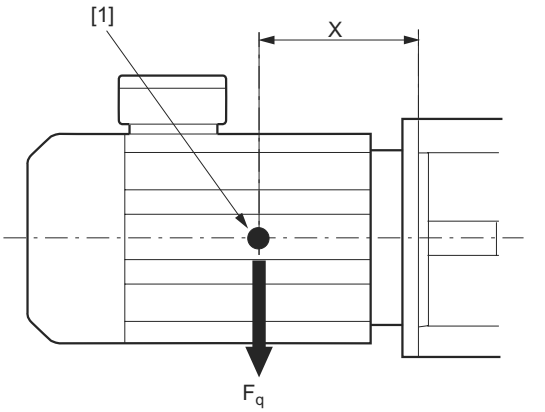
Mounting type	Series / industrial gear unit design	
	 MC.PL..	MC.RL..
Foot-mounted	$G_M \leq G_G$	$G_M \leq G_G$
Shaft-mounted	$G_M \leq 0.5G_G$	$G_M \leq G_G$
Flange-mounted	$G_M \leq 0.5G_G$	$G_M \leq G_G$

Mounting type	Series / industrial gear unit design	
	 MC.PV..	 MC.RV..
Foot-mounted	$G_M \leq 1.5G_G$	$G_M \leq G_G$
Shaft-mounted	$G_M \leq G_G$	$G_M \leq G_G$
Flange-mounted	$G_M \leq G_G$	$G_M \leq 0.75G_G$

Mounting type	Series / industrial gear unit design	
	 MC.PE..	MC.RE..
Foot-mounted	$G_M \leq G_G$	$G_M \leq 1.5G_G$
Shaft-mounted	$G_M \leq G_G$	$G_M \leq G_G$
Flange-mounted	$G_M \leq G_G$	$G_M \leq G_G$

These tables are only valid for stationary operation. If gear unit is moving during (e.g. travel drives) please contact SEW-EURODRIVE.

These tables only apply to the following correlation of motor size/weight Fq and dimension "x".



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[1] Center of gravity of the motor

Motor size		F_q	x
IEC	NEMA	[N]	[mm]
132S	**213/215**	579	189
132M	**213/215**	677	208
160M	**254/286**	1059	235
160L	**254/286**	1275	281
180M	**254/286**	1619	305
180L	**254/286**	1766	305
200L	**324**	2354	333
225S	**365**	2943	348
225M	**365**	3237	348
250M	**405**	4267	395
280S	**444**	5984	433
280M	**445**	6475	433
315S	**505**	8142	485
315M	**505**	8927	485
315L		11772	555

The maximum approved weight of the attached motor F_q has to be reduced in a linear manner if the center of gravity distance x is increased. $F_{q\,max}$ cannot be increased if the center of gravity distance is reduced.

Contact SEW-EURODRIVE in the following cases:

- When retrofitting motor adapters with a cooling air fan (not for motors of sizes 132S and 132M).
- If motor adapter is removed, re-alignment is necessary.

5 Mechanical Installation Options

5.1 Important installation instructions

Disconnect the motor from the power supply before starting work and secure it against unintentional restart!

Important installation notes

- Only use a mounting device for installing input and output elements. Use the center bore and the thread on the shaft end for positioning purposes.
- **Never mount couplings, pinions, etc. onto the shaft end by hitting them with a hammer (damage to bearings, housing and the shaft!).**
- **Observe correct tension of the belt for belt pulleys (in accordance with manufacturer's specifications).**
- Power transmission elements should be balanced after insertion and must not give rise to any impermissible radial or axial forces.

Note:

Installation is easier if you first apply lubricant to the output element or heat it up briefly (to 80-100°C).

Adjust the following misalignments when mounting couplings:

a) Axial misalignment (maximum and minimum clearance)

b) Offset misalignment (concentric running fault)

c) Angular misalignment

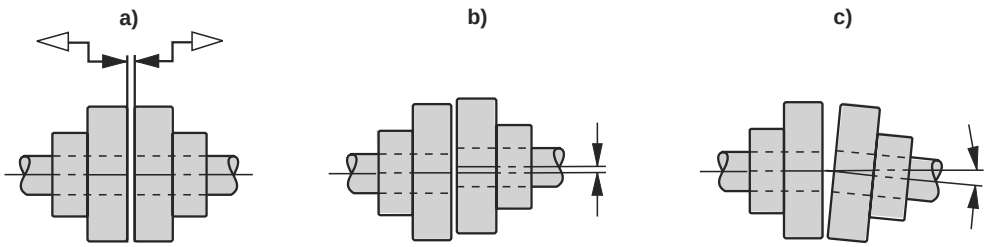

Figure 38: Clearance and misalignment when mounting the coupling

Input and output elements such as couplings must be equipped with a protection cover!

Note:

The following methods for measuring angular and axial misalignment are important for complying with the mounting tolerances specified in Sec. "Mounting of couplings"!

Measuring of angular misalignment with a feeler gauge

The following figure shows the measurement for angular misalignment (α) using a feeler gauge. When using this method, an accurate result is only achieved when the deviation of the coupling faces is eliminated by turning both coupling halves by 180° and the average value is then calculated from the difference ($a_1 - a_2$).

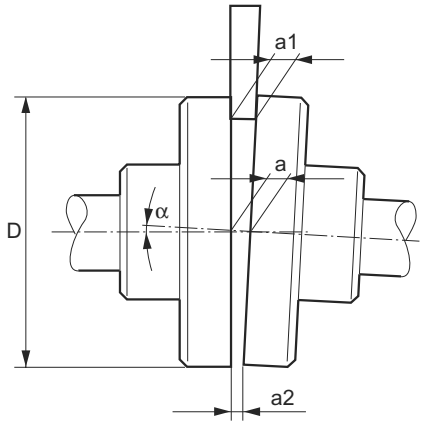

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Figure 39: Measuring angular misalignment using a feeler gauge

Measuring of angular misalignment using a micrometer dial

The following figure shows the measurement for angular misalignment using a micrometer dial. This measuring method provides the same result as described under "Measuring angular offset with a feeler gauge" if the **coupling halves are rotated together**, for instance with one coupling pin, so that the needle of the micrometer dial does not move noticeably on the measuring surface.

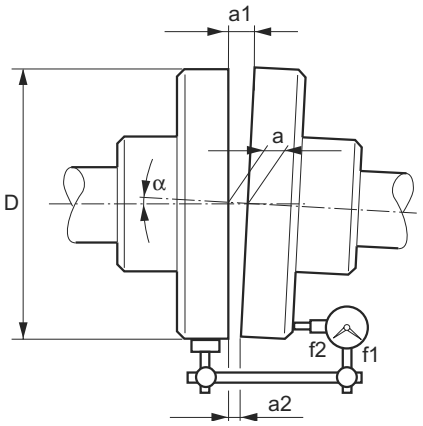

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Figure 40: Measuring angular misalignment using a micrometer dial

A prerequisite for this measuring method is that there is no axial play in the shaft bearings when the shafts rotate. If this condition is not fulfilled, the axial play between the faces of the coupling halves must be eliminated. As an alternative, you can use two micrometer dials positioned on the opposite sides of the coupling (to calculate the difference of the two micrometer dials when rotating the coupling).

Measuring of offset misalignment using straight-edge and micrometer dial

The following figure shows the measurement for offset misalignment using a straight-edge. Permissible values for eccentricity are usually so small that the best measurement results can be achieved with a micrometer dial. If you **rotate one coupling half** together with the micrometer dial and divide the deviation by two, the micrometer dial will indicate the deviation and as a result the misalignment (dimension "b"), which includes the offset misalignment of the other coupling half.

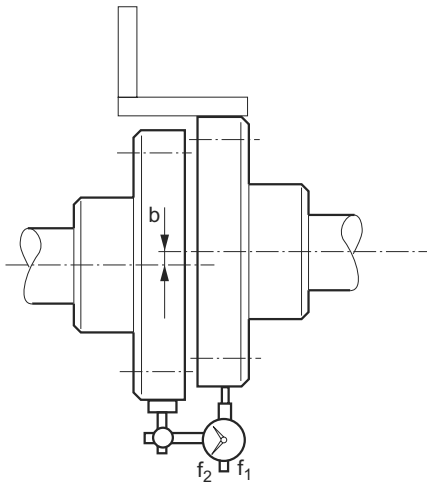

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Figure 41: Measuring offset misalignment using straight-edge and micrometer dial

Measuring of offset misalignment using a micrometer dial

The following figure shows the measurement for offset misalignment using a **more accurate measuring method**. The **coupling halves** are **rotated together** without the tip of the micrometer dial moving on the measuring surface. The offset misalignment is obtained by dividing the deviation indicated on the micrometer dial (dimension "b").

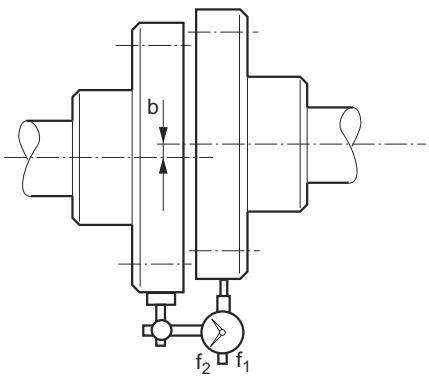

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Figure 42: Measuring offset misalignment using a micrometer dial

5.2 Mounting of couplings

ROTEX coupling

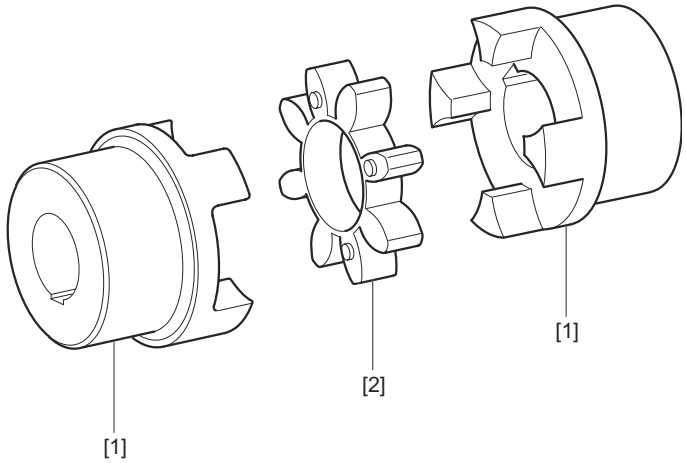

Figure 43: Design of the ROTEX coupling

[1] Coupling hub

[2] Ring gear

The low-maintenance, elastic ROTEX coupling is capable of compensating radial and angular misalignment. Careful and exact alignment of the shaft ensures long service life of the coupling.

Mounting the coupling halves onto the shaft

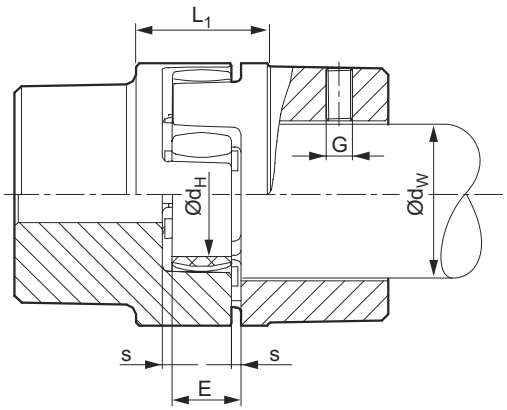

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Figure 44: Mounting dimensions of the ROTEX coupling

Coupling size	Mounting dimensions						Locking screw	
	E [mm]	s [mm]	d_H [mm]	d_W [mm]	L_1 (Alu / GG / GGG) [mm]	L_1 (steel) [mm]	G	Tightening torque [Nm]
14	13	1.5	10	7	-	-	M4	2.4
19	16	2	18	12	26	-	M5	4.8
24	18	2	27	20	30	-	M5	4.8
28	20	2.5	30	22	34	-	M6	8.3
38	24	3	38	28	40	60	M8	20
42	26	3	46	36	46	70	M8	20
48	28	3.5	51	40	50	76	M8	20
55	30	4	60	48	56	86	M10	40
65	35	4.5	68	55	63	91	M10	40
75	40	5	80	65	72	104	M10	40
90	45	5.5	100	80	83	121	M12	69
100	50	6	113	95	92	-	M12	69
110	55	6.5	127	100	103	-	M16	195
125	60	7	147	120	116	-	M16	195
140	65	7.5	165	135	127	-	M20	201
160	75	9	190	160	145	-	M20	201
180	85	10.5	220	185	163	-	M20	201

The shaft distance must be strictly observed (dimension E) to ensure axial play of the coupling.

Mounting dimensions ROTEX coupling in motor adapter

Tighten the set screws (A) to avoid axial play of the coupling.

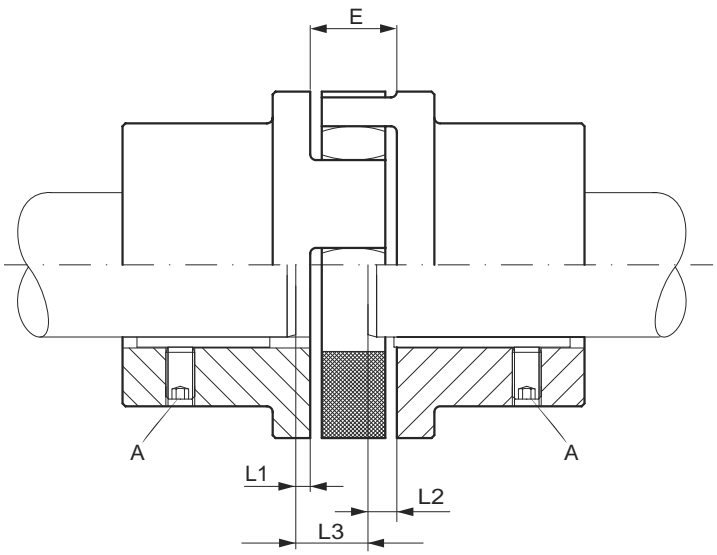

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Figure 45: Mounting dimensions of the ROTEX coupling at the HSS (input shaft) – motor adapter

The mounting dimensions specified in the following table only apply to mounting a ROTEX coupling in a motor adapter. They apply to all gear unit versions and gear ratios.

ROTEX coupling size	IEC motor size	Mounting dimensions			
		E [mm]	L_1 [mm]	L_2 [mm]	L_3 [mm]
R28/38	**132**	20	0	–17	3
R38/45	**160**	24	1	0	25
R42/55	**180/200**	26	–1	0	25
R48/60	**225**	28	0	–3	25
R55/70	**225**	30	0	–5	25
R65/75	**250/280**	35	0	–10	25
R75/90	**315**	40	0	–15	25
R90/100	**315**	45	–20	0	25

The shaft distance must be strictly observed (dimension E) to ensure axial play of the coupling.

Nor-Mex coupling, types G and E

The low-maintenance Nor-Mex couplings types G and E are torsionally flexible couplings capable of compensating axial, angular, and radial shaft misalignments. Torque is transmitted via an elastic element with high damping properties, which is also oil and heat resistant. The couplings can be used for either direction of rotation and can be mounted in any position. The design of the Nor-Mex coupling type G allows to replace the elastic element [5] without movement of the shafts.

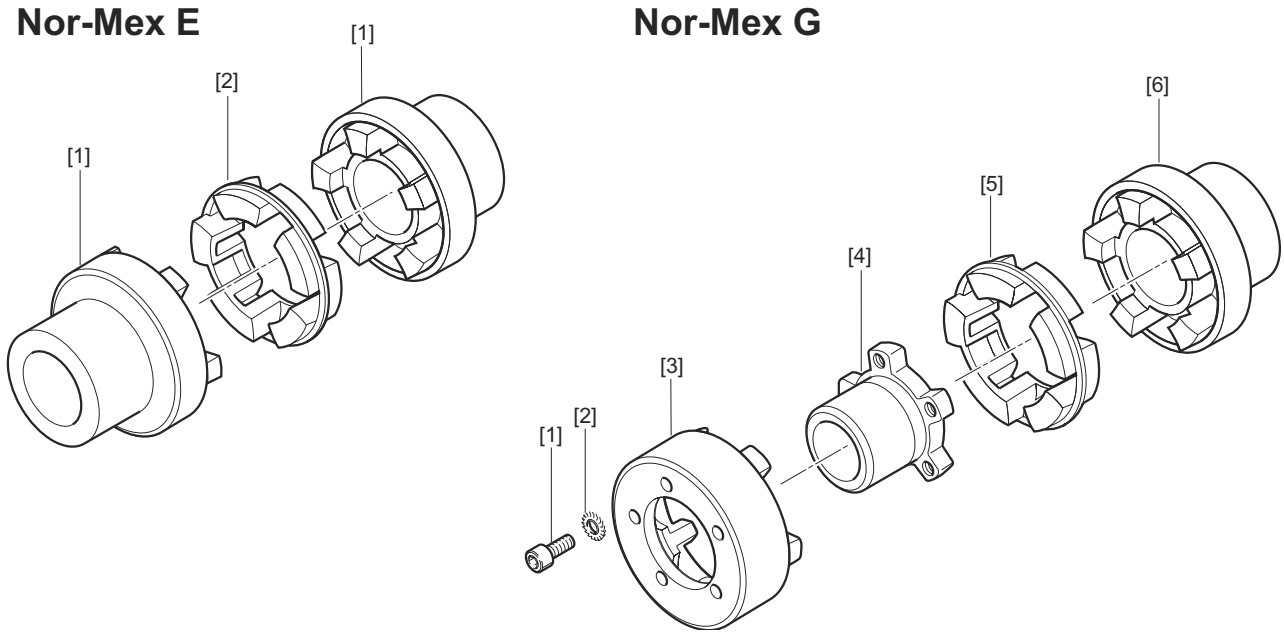

Figure 46: Design of the Nor-Mex E / Nor-Mex G coupling

[1] Coupling hub
[2] Elastic element

[1] Socket head screw
[2] Washer
[3] Claw ring
[4] Flange hub
[5] Elastic element
[6] Coupling hub

Mounting instructions, mounting dimensions for Nor-Mex G couplings

After having mounted the coupling halves, ensure that the recommended play (dimension S_2 for type G, dimension S_1 for type E) and the overall length (dimension L_G for type G and dimension L_E for type E) corresponds with the dimensions given in the following tables. Accurate alignment of the coupling (→ Sec. 'Mounting tolerances') ensures long service life.

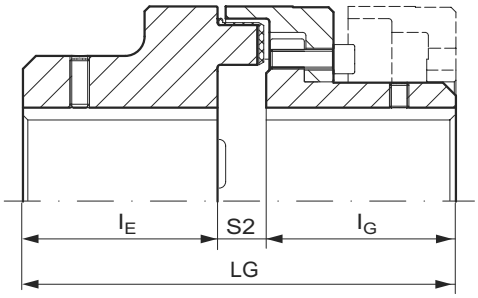

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Figure 47: Mounting dimensions of the Nor-Mex G coupling

Nor-Mex G Coupling size	Mounting dimensions				Weight [kg]
	l_E [mm]	l_G [mm]	L_G [mm]	Permitted tolerance S_2 [mm]	
82	40	40	92	12±1	1.85
97	50	49	113	14±1	3.8
112	60	58	133	15±1	5
128	70	68	154	16±1	7.9
148	80	78	176	18±1	12.3
168	90	87	198	21±1.5	18.3
194	100	97	221	24±1.5	26.7
214	110	107	243	26±2	35.5
240	120	117	267	30±2	45.6
265	140	137	310	33±2.5	65.7
295	150	147	334	37±2.5	83.9
330	160	156	356	40±2.5	125.5
370	180	176	399	43±2.5	177.2
415	200	196	441	45±2.5	249.2
480	220	220	485	45±2.5	352.9
575	240	240	525	45±2.5	517.2

Mounting dimensions of the Nor-Mex E coupling

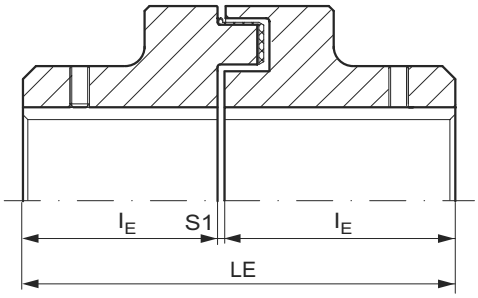

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Figure 48: Mounting dimensions of the Nor-Mex E coupling

Nor-Mex E Coupling size	Mounting dimensions			
	l_E [mm]	LE [mm]	Permitted tolerance S_1 [mm]	Weight [kg]
67	30	62.5	2.5± 0.5	0.93
82	40	83	3± 1	1.76
97	50	103	3± 1	3.46
112	60	123.5	3.5± 1	5
128	70	143.5	3.5± 1	7.9
148	80	163.5	3.5± 1.5	12.3
168	90	183.5	3.5± 1.5	18.4
194	100	203.5	3.5± 1.5	26.3
214	110	224	4± 2	35.7
240	120	244	4± 2	46.7
265	140	285.5	5.5± 2.5	66.3
295	150	308	8± 2.5	84.8
330	160	328	8± 2.5	121.3
370	180	368	8± 2.5	169.5
415	200	408	8± 2.5	237
480	220	448	8± 2.5	320
575	240	488	8± 2.5	457

Mounting dimensions of the Nor-Mex coupling type G in the motor adapter

Tighten the set screws (A) to avoid axial play of the coupling.

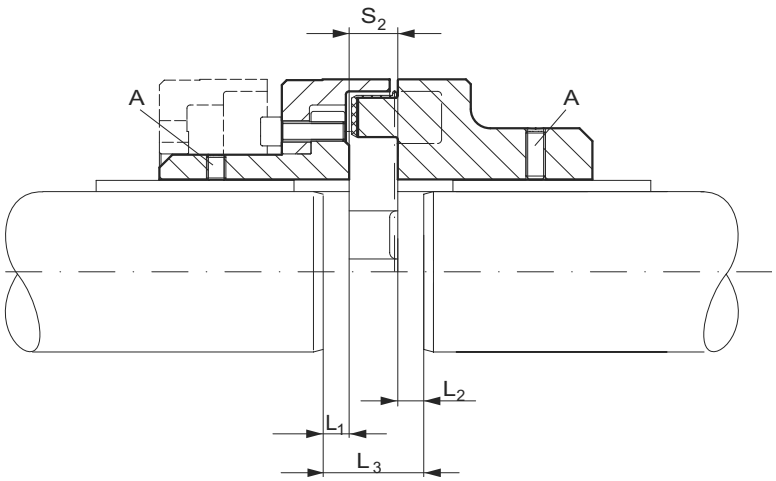

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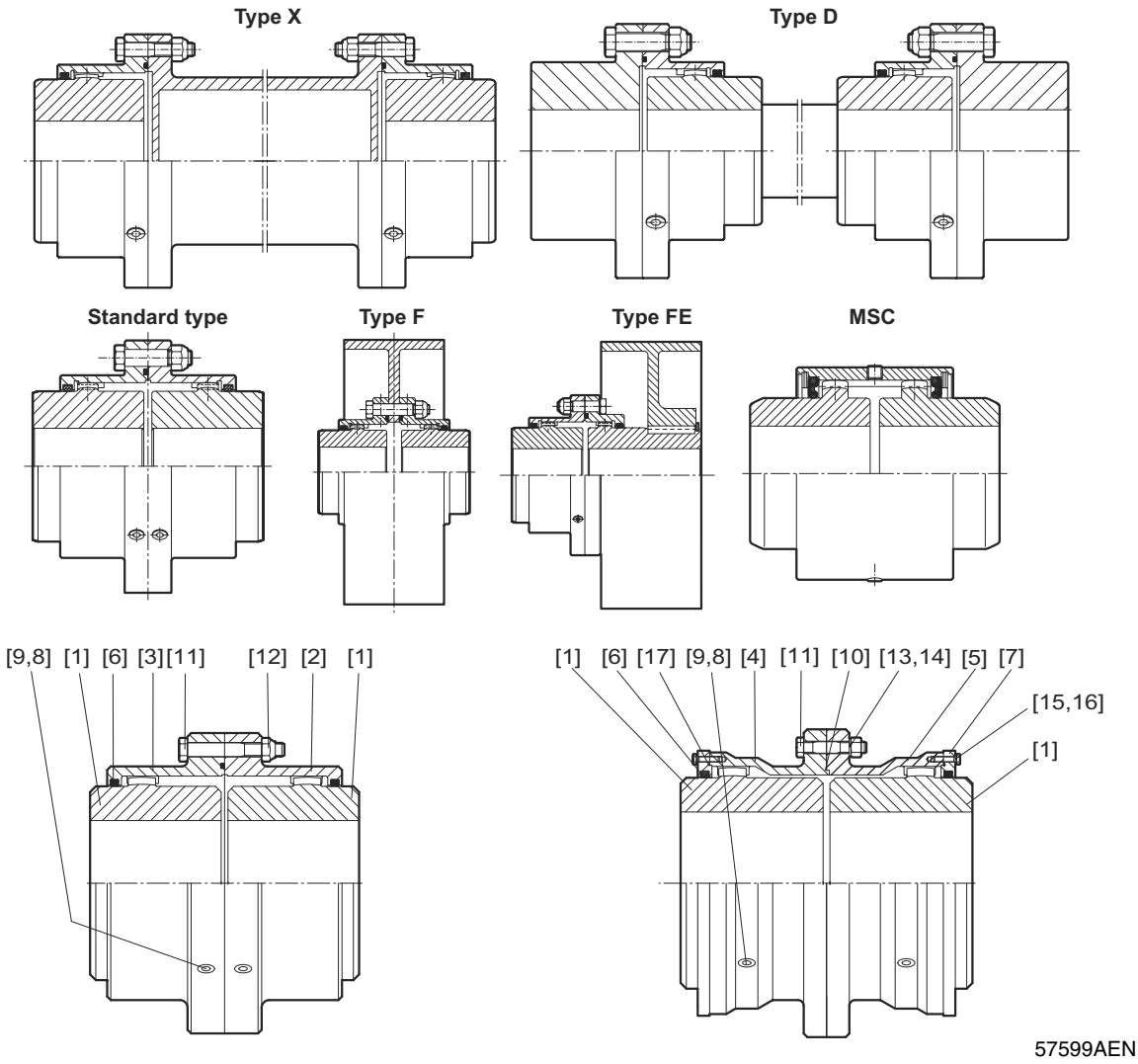
Figure 49: Mounting dimensions of the Nor-Mex coupling on the HSS (input shaft) – motor adapter

The mounting tolerances specified in the following table only apply to mounting a Nor-Mex coupling in a motor adapter.

NOR-MEX coupling size G..		97	97	112	128	148	168	194	214
	IEC motor size	132	160	160/180	200	225	250/280	280/315	315
Gear unit size Gear ratio i	Mounting dimension	[mm]							
All All	S_2	14	14	15	16	18	21	24	26
	L_3	3	25	25	25	25	25	25	25
MC3R02 i = 14 ... 63	L_2	-	5	5	5	10	2	1	0
	L_1	-	6	5	4	–3	2	0	–1
MC3R05 i = 14 ... 63	L_2	-	5	5	5	4	2	5	0
	L_1	-	6	5	4	3	2	–4	–1
MC3R08 i = 14 ... 63	L_2	-	5	5	5	4	2	1	5
	L_1	-	6	5	4	3	2	1	–6
Other MC.. i = 7.1 ... 112	L_2	–5	5	5	5	4	2	1	0
	L_1	–6	6	5	4	3	2	0	–1

Flexible jaw couplings MT, MS-MTN series

Mounting



[1] Coupling hub	[7] Cover	[13] Washer
[2] Sleeve	[8] Grease nipple	[14] Nut
[3] Sleeve	[9] Grease nipple	[15] Bolts
[4] Sleeve (male)	[10] Gasket	[16] Washer
[5] Sleeve (female)	[11] Bolt	[17] O-ring
[6] Seal or O-ring	[12] Self-locking nut	

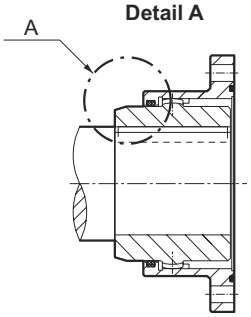
1. Ensure that all parts are clean.
2. Apply a light coat of grease to the O-rings [6] and place them into the grooves of the sleeves [2,3 or 4,5].
3. Apply grease onto the sleeve teeth [2,3 or 4,5]. Place the sleeves onto the shafts without damaging the O-rings [6].

4. For couplings larger than the MS-325 or MT-260 types, you have to grease the O-rings or seals [6] before inserting them in the grooves of the cover [7]. Next, place the covers [7] onto the shafts.

Before installing the hubs [1], heat them but do not exceed 110 °C. Do not use an open flame burner.

5. Install the hubs [1] on their respective shaft with the longest chamfer hub end torwards the machine bearing (see detail A). Hub faces have to be flush with the shaft end.

Detail A



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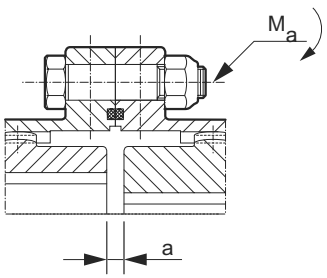
6. Align the shafts to be connected with the coupling hubs and check the spacing "a" between the hubs (see detail B). Refer to the table on page 73) for the according values..

Detail B



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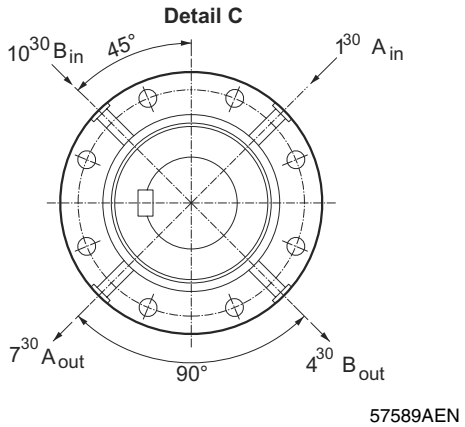
7. Align the two shafts. Check for correct alignment using a dial indicator. The alignment precision depends on the running speed.
8. Allow the hubs [1] to cool before tightening the sleeves [2, 3 or 4, 5) over the hubs. Before installing the sleeves [2, 3 or 4,5], apply grease onto the coupling hub teeth [1].
9. Install the O-ring [10] and thighten the steeves to the recommended thightening torque (see detail B). It is recommended to grease the O-ring. Make sure that the flange lubrication holes are positioned at an angle of 90° to each other.

10. To fill the grease, remove both plugs [9] from the sleeve [2, 3 or 4, 5]. Next, proceed as follows:

    Turn the coupling in such a way that the flange lubrication holes are in 1:30, 4:30, 7:30, 10:30 o'clock positions if the coupling were seen as a clock face. Remove the 1:30 and 7:30 position plugs [9] and pump grease into the 1:30 posizion holes until grease leaks out from the lower 7:30 position hole (see detail C). During this process it is recommended to remove the 10:30 position plug to vent the inside. For grease quality and more accurate quantity, → Section Recommended Lubrication and Quantily. If running conditions differ from those in → Section Recommended Lubrication and Quantity, consult SEW. For HAD, MTD, MSD, MTX, MTXL, MSXL, HAXL, MTCO and MSCO types, each coupling half must be lubricated separately. For MSVS, MTV types, consult SEW.



Maintenace

Every 3000 operating hours.

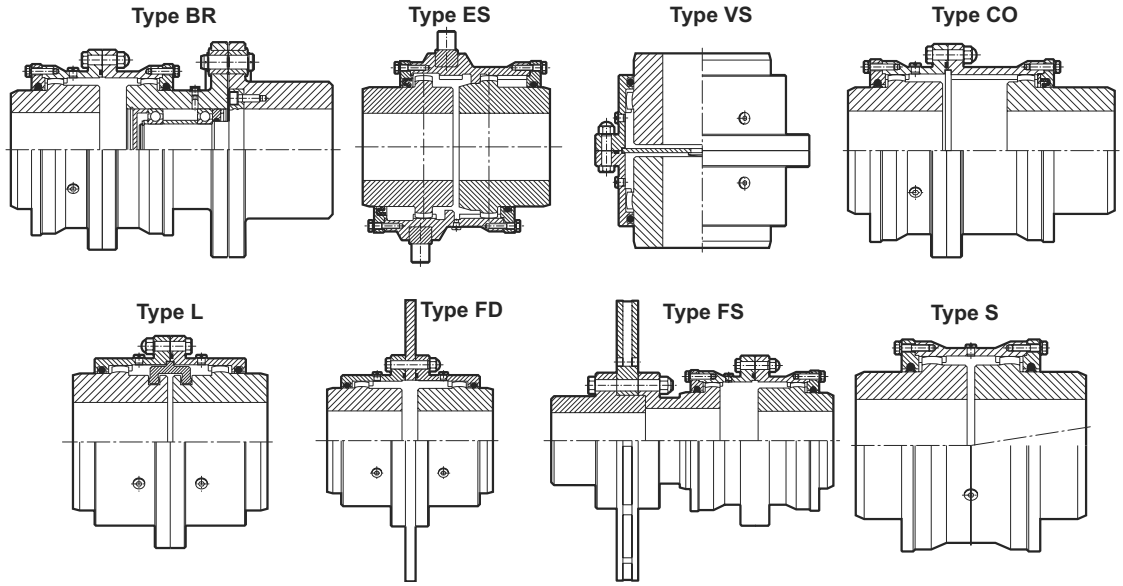
If longer intervals are required, contact SEW. Proceed as mentioned under 11.

Disassembly and condition check

Every 8000 operating hours or every 2 years.

1. Before moving the sleeves, clean the hub surfaces near the O-rings [6] free from rust or dirt.
2. Remove the bolts [11] and the O-ring [10].
3. Check the gearing and sealing.
4. Check for correct alignment.

Mounting tolerance



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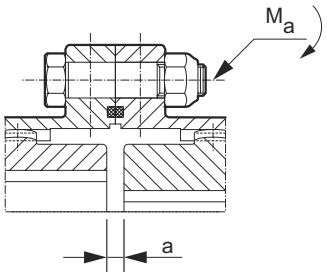

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MT, MS and MTN types					
Size	**a [mm]**	**Size**	**a [mm]**	**Size**	**a [mm]**
MT-MTN-42, MS-5	6±1	**MT-MTN-205, MS-430**	12±3	**MT-460, MS-MN-5250**	20±4
MT-MTN-55, MS-10	6±1	**MT-MTN-230, MS-600**	12±3	**MT-500, MS-MN-6500**	25±4
MT-MTN-70, MS-20	6±2	**MT-MTN-260, MS-800**	12±3	**MT-550, MS-MN-9500**	25±4
MT-MTN-90, MS-35	8±2	**MT-280, MS-MN-1150**	16±3	**MT-590, MS-MN-11000**	25±4
MT-MTN-100, MS-60	8±2	**MT-310, MS-MN-1500**	16±3	**MT-620, MS-MN-13500**	30±6
MT-MTN-125, MS-105	8±2	**MT-345, MS-MN-2100**	16±3	**MT-650, MS-MN-17000**	30±6
MT-MTN-145, MS-150	10±2	**MT-370, MS-MN-2650**	20±4	**MT-680, MS-MN-19000**	30±6
MT-MTN-165, MS-210	10±3	**MT-390, MS-MN-3400**	20±4	**MT-730, MS-MN-22500**	30±6
MT-MTN-185, MS-325	10±3	**MT-420, MS-MN-4200**	20±4	**MT-800, MS-MN-27000**	30±6

MT and MS-MTN types					
Size	**Size Tightening Torque M_A [Nm]**	**Size**	**Size Tightening Torque M_A [Nm]**	**Size**	**Size Tightening Torque M_A [Nm]**
MT-42	8	**MT-205**	325	**MT-460, MS-MN-5250**	760
MT-55	20	**MT-230**	325	**MT-500, MS-MN-6500**	1140
MT-70	68	**MT-26**	565	**MT-550, MS-MN-9500**	1140
MT-90	108	**MT-280, MS-MN-1150**	375	**MT-590, MS-MN-11000**	1140
MT-100	108	**MT-310, MS-MN-1500**	375	**MT-620, MS-MN-13500**	1800
MT-125	230	**MT-345, MS-MN-2100**	660	**MT-650, MS-MN-17000**	1800
MT-145	230	**MT-370, MS-MN-2650**	660	**MT-680, MS-MN-19000**	1800
MT-165	230	**MT-390, MS-MN-3400**	760	**MT-730, MS-MN-22500**	1800
MT-185	325	**MT-420, MS-MN-4200**	760	**MT-800, MS-MN-27000**	1800

MS-MTN types			
Size	**Size Tightening Torque M_A [Nm]**	**Size**	**Size Tightening Torque M_A [Nm]**
MS-5, MTN-42	20	**MS-150, MTN-145**	108
MS-10, MTN-55	39	**MS-210, MTN-165**	108
MS-20, MTN-70	39	**MS-325, MTN-185**	325
MS-35, MTN-90	68	**MS-430, MTN-205**	325
MS-60, MTN-100	68	**MS-600, MTN-230**	325
MS-105, MTN-125	68	**MS-800, MTN-260**	375

Recommended Lubricants and Quantity

	Company	Oil
Normal operation conditions	**Amoco**	Amoco coupling grease
	Castrol	Spheerol BN 1
	Cepsa-Krafft	KEP 1
	Esso-Exxon	Unirex RS 460, Pen-0- Led EP
	Fina	Ceran EP-0
	Klüber	Klüberplex GE 11-680
	Mobil	Mobilgrease XTC, Mobiltemp SHC 460 spezial
	Shell	Shell Albida GC1
	Texaco	Coupling grease KP 0/1 K-30
	Verkol	Verkol 320-1 Grado 1
Normal speed and heavy duty operation	**Klüber**	Klüberplex GE 11-680
	Texaco	Coupling grease KP 0/1 K-30
HIGH SPEED[1)]	**Amoco**	Coupling grease
	Esso-Exxon	Unirex RS-460
	Klüber	Klüberplex GE 11-680
	Mobil	Mobilgrease XTC
	Texaco	Coupling grease KP 0/1 K-30

1) Circumferential speed > 80 m/s

Greases for operation between 0°C and 70°C.

The couplings are supplied with a protective grease only, which is not sufficient for normal operation.

Before mounting the coupling, apply approx. 70 % of the grease quantity manually between hub and sleeve teeth as well as to the surrounding area. After mounting, press the remaining 30 % of the grease into the flange lubrication holes.

Class NLGI 0 grease is recommended for speeds below 300 rpm and NLGI 00 for very low speeds. In both cases, the greases must have good adherence. More frequent lubrication intervals than advised in this operating instructions are required for high temperatures, low speeds, and reversing drives.

MT type					
Size	**Quantity[1] [kg]**	**Size**	**Quantity[1] [kg]**	**Size**	**Quantity[1] [kg]**
MT-42	0.04	**MT-205**	2.20	**MT-460**	11.50
MT-55	0.06	**MT-2300**	2.80	**MT-500**	11.50
MT-70	0.17	**MT-260**	4.50	**MT-550**	14.50
MT-90	0.24	**MT-280**	3.00	**MT-590**	23.00
MT-100	0.36	**MT-310**	3.60	**MT-620**	23.00
MT-125	0.50	**MT-345**	4.50	**MT-650**	30.00
MT-145	0.70	**MT-370**	5.00	**MT-680**	36.00
MT-165	1.30	**MT-390**	9.00	**MT-730**	38.00
MT-185	1.75	**MT-420**	9.80	**MT-800**	46.00

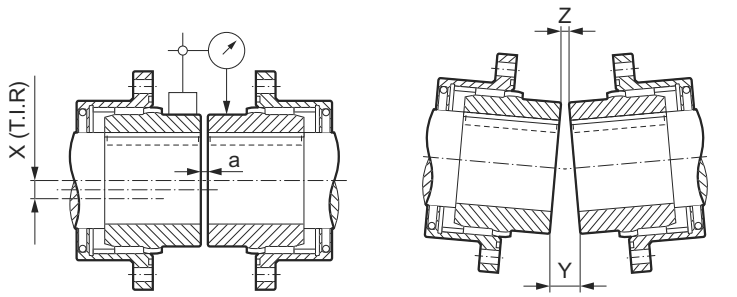
1) Quantity per complete coupling types MT, MTCL, MTL, MSL, MTK, MSK, MTBR, MSBR, MTFD, MSFD, MTFS, MSFS, MTFE, MSFE, MTF, MSF, MTB, MTST-B, MTN.

MS and MN type					
Size	**Quantity[1] [kg]**	**Size**	**Quantity[1] [kg]**	**Size**	**Quantity[1] [kg]**
MS-5, MTN-42	0.07	**MS-430, MTN-205**	1.60	**MS-MN-5250**	10.50
MS-10, MTN-55	0.10	**MS-600, MTN-230**	2.00	**MS-MN-6500**	11.40
MS-20, MTN-70	0.12	**MS-800, MTN-260**	2.00	**MS-MN-9500**	14.00
MS-35, MTN-90	0.22	**MS-MN-1150**	3.40	**MS-MN-11000**	21.00
MS-60, MTN-100	0.30	**MS-MN-1500**	3.66	**MS-MN-13500**	22.00
MS-105, MTN-125	0.40	**MS-MN-2100**	4.60	**MS-MN-17000**	28.00
MS-150, MTN-145	0.60	**MS-MN-2650**	5.30	**MS-MN-19000**	34.00
MS-210, MTN-165	1.00	**MS-MN-3400**	8.20	**MS-MN-22500**	40.00
MS-325, MTN-185	1.10	**MS-MN-4200**	8.60	**MS-MN-27000**	45.00

1) Quantity per complete coupling types MT, MTCL, MTL, MSL, MTK, MSK, MTBR, MSBR, MTFD, MSFD, MTFS, MSFS, MTFE, MSFE, MTF, MSF, MTB, MTST-B, MTN.

For types MTD, MSD, HAD, MTX, MSX, HAX, MSXL, MTXL, MTBRX, MSBRX, MTSR-P, apply the given quantity divided by 2 to each coupling half. Example: MTX-125, 0.25 kg for each half. For types MSS, MTS, MSC, MTCO, MSCO, MTES, vertical couplings and disengaging couplings, consult our Technical Department

Alignment precision



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Types		Speed [rpm]									
		0-250		250-500		500-1000		1000-2000		2000-4000	
MT	MS-MN	x_{max}	(y-z)	x_{max}	(y-z)	x_{max}	(y-z)	x_{max}	(y-z)	x_{max}	(y-z)
		[mm]									
42–90	**5-35**	0.25	0.25	0.25	0.25	0.25	0.25	0.15	0.20	0.08	0.10
100-185	**60-325**	0.50	0.60	0.50	0.60	0.25	0.35	0.15	0.20	0.08	0.10
205-420	**430-4200**	0.90	1.00	0.50	0.75	0.25	0.35	0.15	0.20	-	-
420-	**5250-**	1.50	1.50	1.0	1.00	0.50	0.50	-	-		

5.3 Backstop FXM

The purpose of a backstop is to prevent undesirable reverse rotation. During operation, the backstop permits rotation in one specified direction of rotation only.

- **Do not start up the motor in blocking direction. Ensure correct connection of power supply with motor to achieve the desired direction of rotation! Running the motor in blocking direction might destroy the backstop!**
- **Contact SEW-EURODRIVE if you want to alter the blocking direction!**

The maintenance-free FXM type backstop is a centrifugally operated backstop with sprags that lift off. Once the lift-off speed is reached, the sprags completely lift off from the contact surface of the outer ring. The backstop is lubricated with gear oil. An arrow on the gear unit housing indicates the permitted direction of rotation [1] (→ following figure).

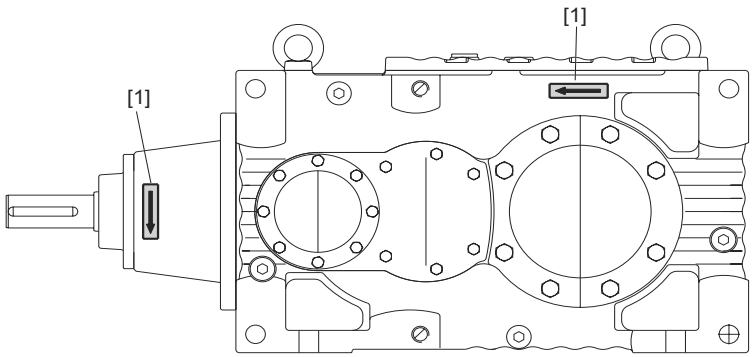

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Figure 50: Arrow on the gear unit housing indicating the permitted direction of rotation

Changing the direction of rotation

To change the direction of rotation, turn the inner ring with the sprags by 180°. Pull out the inner ring with the sprags using a pulling-off device (not included in the scope of delivery) and replace turned by 180°.

... backstop mounted outside the gear unit

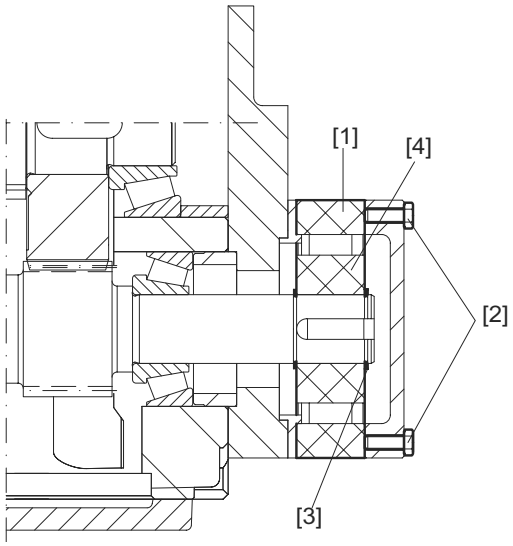

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Figure 51: Changing the direction of rotation with backstop mounted outside the gear unit

[1] Outer ring
[2] Retaining screws
[3] Circlip
[4] Inner ring with cage and sprags

- Drain the gear oil (→ Sec."Inspection and Maintenance").
- Loosen the retaining screws [2] of the backstop.
- Remove the outer ring [1]. To facilitate dismounting, slightly turn the outer ring [2] in freewheeling direction.
- Remove circlip [3], and inner ring with cage and sprags [4].
- Turn the inner ring [4] with the sprags by 180° and replace the parts in reverse order. When mounting the backstop, do not apply pressure to the cage with the sprags but to the inner ring [4] only. Use the threaded holes on the inner ring [4] for mounting.
- Lock the inner ring [4] with the circlip [3] in axial direction. Mount the outer ring [1] using the retaining screws [2]. Observe the tightening torques specified in the table below:

Screw size	Tightening torque [Nm]
M5	6
M6	10
M8	25
M10	48
M12	84
M16	206
M20	402
M24	696
M30	1420

- Alter the direction arrow on the gear unit housing (Figure 50).
- Refill the gear oil (→ Sec. Lubricants). Check the oil level.
- After mounting, check that the backstop runs smoothly.

... with backstop mounted inside the gear unit

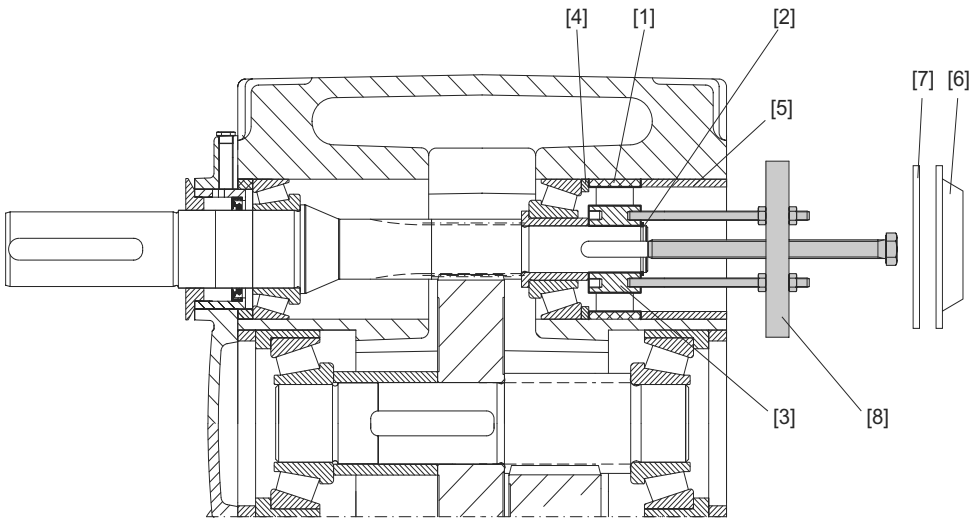


Figure 52: Changing the direction of rotation with backstop mounted inside the gear unit

[1] Outer ring
[2] Circlip
[3] Inner ring with cage and sprags
[4] Spacer
[5] Sleeve
[6] Bearing cover
[7] Shims
[8] Pulling-off device

- Drain the gear oil (→ Sec."Inspection and Maintenance").
- Remove bearing cover [6], shims [7] and sleeve [5]. It is important that shims [7] and sleeve [5] between bearing cover [6] and outer ring [1] are not mixed up because they must be assembled in the correct order.
- Remove the circlip [2] from the input shaft.
- Remove the inner ring with the cage and the sprags [3] using a suitable pull-off device [8]. Use the threaded holes on the inner ring [3] for removal.
- Turn the inner ring [3] with the sprags by 180° and replace the parts in reverse order. When mounting the backstop, do not apply pressure to the cage with the sprags but to the inner ring [3] only.
- When mounting the backstop, turn it in freewheeling direction so that the sprags move into the outer ring.
- Secure the inner ring [3] with the circlip [2] in axial direction.
- Mount sleeve [5], shims [7] and bearing cover [6] in reverse order.
- Change the direction arrow on the gear unit housing.
- Refill the gear oil (→ Sec. Lubricants). Check the oil level.
- After mounting, check that the backstop runs smoothly.

5.4 Shaft end pump SHP

Usage

If pressure lubrication is required (→ section "Lubrication"), the maintenance-free shaft end pump SHP with external piping is the preferred solution for gear unit sizes 04…09.

The maintenance-free shaft end pump SHP.. can be used to lubricate gear unit parts of gear unit sizes 04 to 09 that are not submerged in the oil bath. The shaft end pump can be operated in both directions of rotation.

A minimum input speed is required for correct functioning of the shaft end pump. It is therefore absolutely mandatory to contact SEW in case of variable input speeds (e.g. with inverter controlled drives) or when changing the input speed range of an already delivered gear unit with shaft end pump.

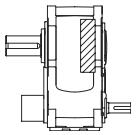
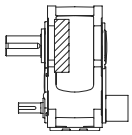
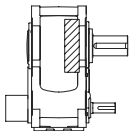
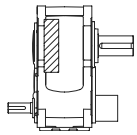
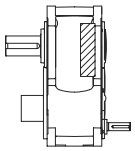
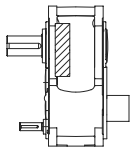
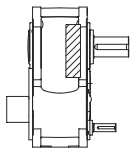
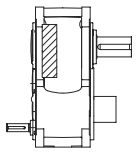
Pump position

The pump is mounted externally to the gear unit and is directly driven by the input shaft (HSS) or intermediate shaft of the gear unit. A high reliability of the pump function is ensured in this way. The pump position depends on the

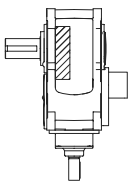
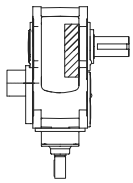
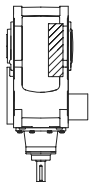
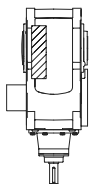
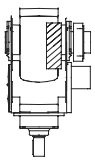
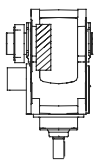
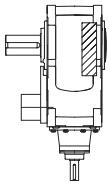
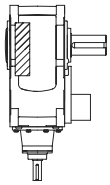
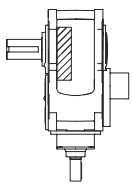
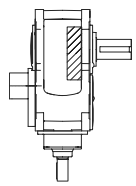
- number of gear unit stages
- gear unit type (helical or bevel-helical)
- shaft position of the gear unit
- LSS type

Check for interference of the shaft end pump with other surrounding structures.

The following tables indicate the position of the pump:

	Shaft positions			
	23	13[1)]	24[1)]	14
MC2P • Solid shaft • Hollow shaft with keyway • Hollow shaft with shrink disc				
MC3P • Solid shaft • Hollow shaft with keyway • Hollow shaft with shrink disc				

1) The maximum permitted external loads on the LSS are lower

	Shaft positions			
	03	04	03[1)]	04[1)]
MC2R • Solid shaft				
MC2R • Hollow shaft with keyway				
MC2R • Hollow shaft with shrink disc				
MC3R • Solid shaft • Hollow shaft with keyway • Hollow shaft with shrink disc				

1) The maximum permitted external loads on the LSS are lower.

Pump suction

- **It is essential that the gear unit is sufficiently lubricated from the very beginning!**
- **Do not change the diameter of the tube / pipe connection!**
- **Do not open the pressure line [PRE]!**
- **If the shaft end pump does not build up pressure with in 10 seconds after the gear unit has been started (flow switch or - visual indicator) please contact SEW-EURODRIVE.**

Shaft end pump mounted on top of the MC.V.. gear unit

Danger of dry-start with shaft end pump mounted on top of gear unit.

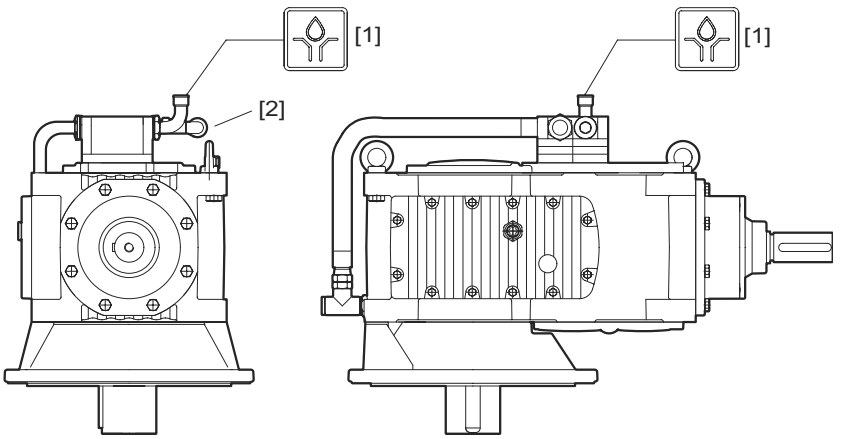


Figure 53: Shaft end pump mounted top of the gear unit

[1] seperate suction oil filling plug

[2] Flow switch or visual flow indicator (not visible in drawing)

It is essential that the oil pump begins to pump oil at the same time when the main motor begins to rotate. If the pump does not begin to pump oil immediately when gear unit begins to rotate, the separate suction oil filling plug of the pump [1] must be opened and some oil (1-4 liter) must be poured in. When oil begins to circulate (control with flow switch or visual flow indicator [2]) close the separate suction oil filling plug [1].

This procedure is especially important when the gear unit has been standing for a long period and suction pipe and oil pump is full of air.

5.5 Installation with steel frame

For industrial gear units of the MC series in horizontal mounting position (MC2P**L**.., MC3P**L**.., MC2R**L**.., MC3R**L**..), SEW-EURODRIVE supplies preassembled drive packages on a steel frame (swing base or base frame).

Swing base

A swing base is a steel frame [1] that accommodates gear unit, (hydro) coupling and motor (and brake, if required) such as

- hollow shaft gear unit or
- solid shaft gear unit with flange coupling on the output shaft

The swing base [1] is supported by a torque arm [2] (→ Sec. "Torque arm").

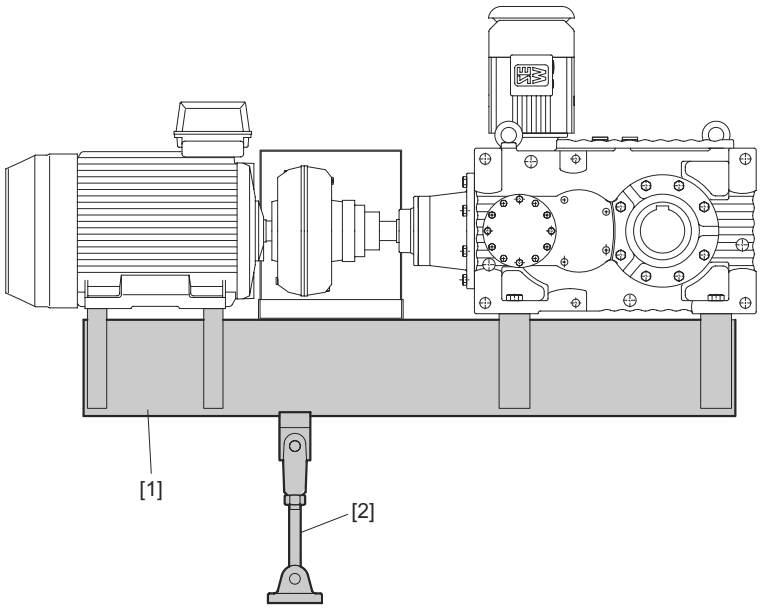


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Figure 54: Industrial gear unit of the MC.. series on swing base with torque arm

[1] Swing base
[2] Torque arm

It is essential that

- **the system is dimensioned in such a way that the torque of the torque arm can be absorbed (→ Sec. "Gear unit foundation")**
- **that the swing base is not deformed during installation (hazard of damage to gear unit and coupling)**

If the gear unit makes sideways movement during running or if there are noticeable frequent torque peaks, the rigid torque arm should not be used, instead a torque arm with a flexibel bushing should be used. Please contact SEW.

Base frame

A base frame is a steel frame [1] that accommodates gear unit, (hydro) coupling and motor (and brake, if required). The steel frame is supported by several foot mountings [2]. Such a frame is usually used for solid shaft gear units with elastic coupling on the output shaft.

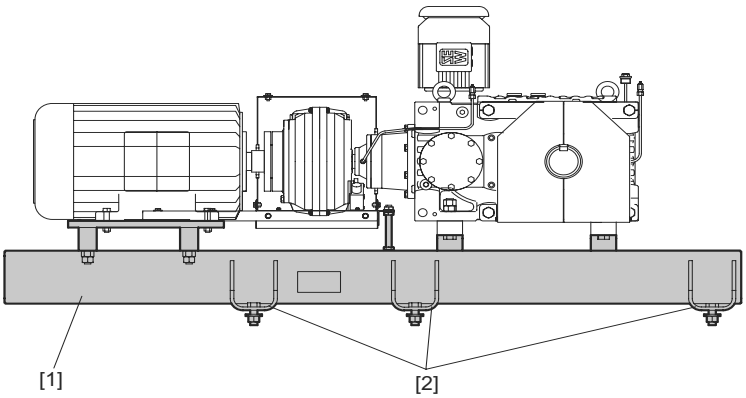

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Figure 55: MC.. industrial gear units on base frame with foot mounting

[1] Base frame

[2] Foot mounting

It is essential that

- **the support structure of the foot mounting is adequately dimensioned and rigid (→ Sec. "Gear unit foundation")**
- **that the base frame is not deformed through incorrect alignment (hazard of damage to gear unit and coupling)**.

5.6 Torque arm

If the gear unit makes sideways movement during running or if there are noticeable frequent torque peaks, the rigid torque arm should not be used, instead a torque arm with a flexible bushing should be used. Please contact SEW-EURODRIVE.

Mounting options

A torque arm is available as option to be mounted directly to the gear unit or to the swing base.

Directly mounted to the gear unit

Always mount the torque arm on the side of the driven machine.

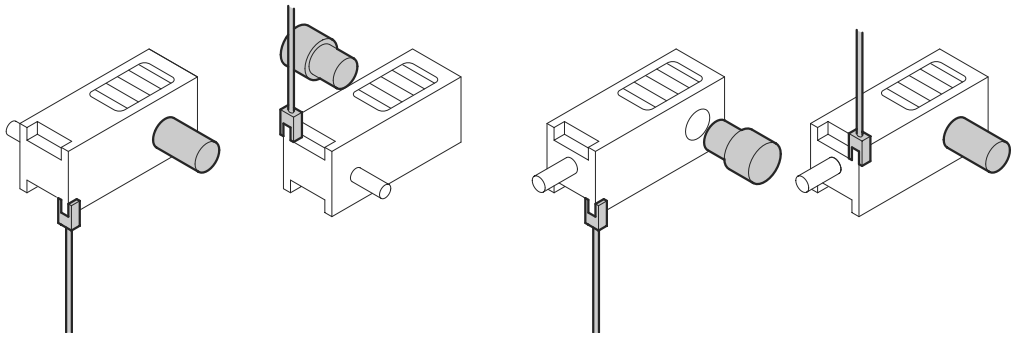

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Figure 56: Mounting options for the torque arm

The torque arm can be directly mounted to the gear unit both in the case of tensile strain and compressive stress. Additional strain or stress to the gear unit can be caused by

- eccentricity during operation
- expansion of the driven machine due to heat.

To avoid such strain, the anchor bolt [5418] is equipped with double connection elements that allow sufficient lateral and radial play [1].

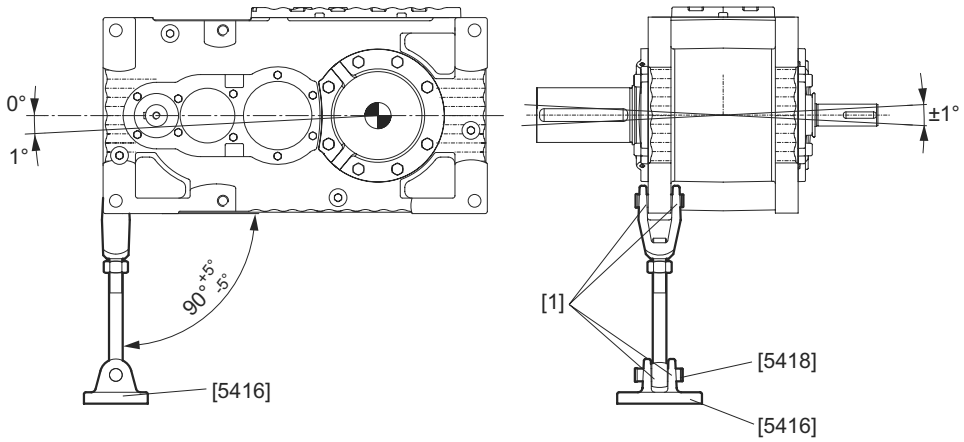

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Figure 57: Torque arm directly mounted to the gear unit

It is essential that there is sufficient play [1] between torque arm and retaining plate [5416] as well as between torque arm and gear unit. This way, no bending force can act on the torque arm and the bearings of the output shaft are not subjected to additional stress.

Foundation for the torque arm

To build the foundation for the torque arm directly mounted to the gear unit or mounted to the swing base of the motor, do the following:

- Place the supporting girders horizontally in their fixed locations. Embody the supporting girders in the base concrete [A].
- Reinforce the concrete base [A] and interlock using steel rods. The base concrete (A) must withstand the same load as the weld joints of the foundation screws.
- After having mounted the torque arm, carry out the grouting and bond it to the base concrete with steel rods.

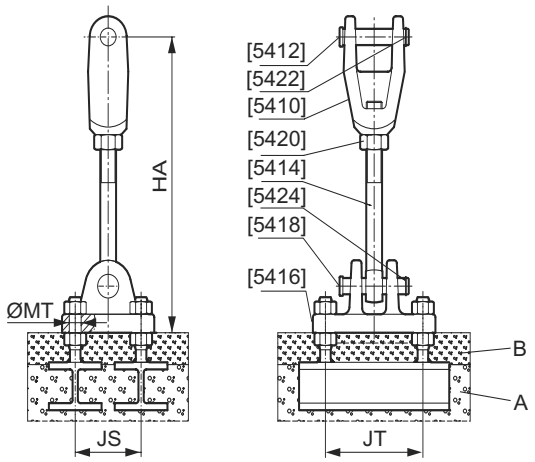


Figure 58: Foundation of the torque arm for mounting the swing base

[A] Concrete base	[5416] Anchor plate
[B] Grouting	[5418] Anchoring bolt
[5410] Anchoring	[5420] Hex nut
[5412] Anchoring bolt	[5422] Retaining ring
[5414] Eye bolt	[5424] Retaining ring

All parts except positions A and B are included in the scope of delivery.

The length HA of the torque arm (→ table below) can be selected as required in the range between HA_{min} and HA_{max}. The torque arm is supplied as special version if HA is required longer than HA_{max}.

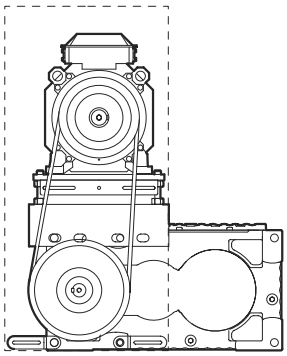
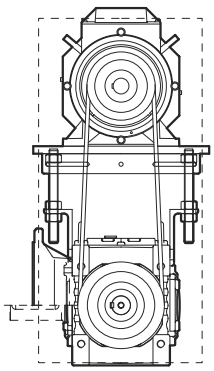
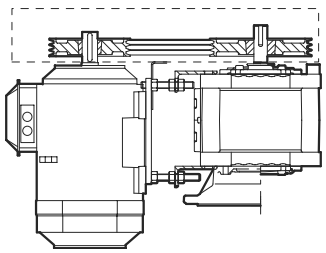
Gear unit size	HA [mm] min. ... max.	JT [mm]	JS [mm]	∅ MT [mm]
02, 03	360 ... 410	148	100	18
04, 05	405 ... 455			
06, 07	417 ... 467			
08, 09	432 ... 482	188	130	22

5.7 Mounting of V-belt drive

A V-belt drive is used when the overall gear ratio needs to be adjusted. The standard scope of delivery includes motor bracket, belt pulleys, V-belts and belt guard.

Observe the permitted weight for motor and gear unit specified in the following table:

G_M = Motor weight G_G = Gear unit weight

	MC2P/MC3P	MC2R/MC3R
Upright mounting: **Foot mounted $G_M \leq 0.4 \times G_G$** **Shaft mounted $G_M \leq 0.4 \times G_G$** **Flange mounted $G_M \leq 0.4 \times G_G$**	Contact SEW-EURODRIVE	Contact SEW-EURODRIVE
Horizontal LSS mounting: **Foot mounted $G_M \leq 1.0 \times G_G$** **Shaft mounted $G_M \leq 1.0 \times G_G$** **Flange mounted $G_M \leq G_G$**	 54046AXX	 54047AXX
Vertical LSS mounting: **Foot mounted $G_M \leq 0.4 \times G_G$** **Shaft mounted $G_M \leq 0.4 \times G_G$** **Flange mounted $G_M \leq 0.4 \times G_G$**	 54052AXX	Contact SEW-EURODRIVE

Higher motor weights only allowable if stated in the order specific documents.

G_M = Motor weight

G_G = Gear unit weight

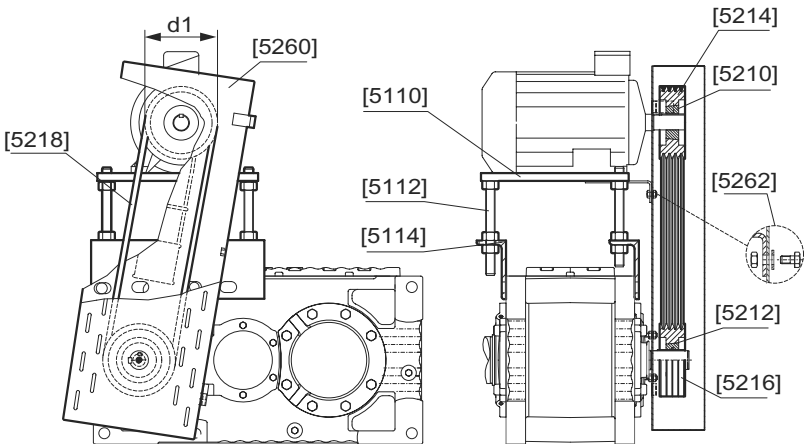


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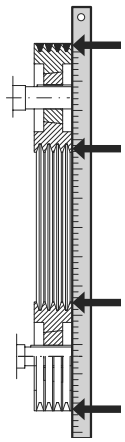
Figure 59: V-belt drive

[5110, 5112] Motor bracket	[5214, 5216] Belt pulleys
[5114] Angle bracket	[5218] V-belt
[5210, 5212] Taper bushing	[5260] Belt guard cover

Installation

- Mount the motor on the motor bracket (retaining screws not included in the scope of delivery).
- Attach the back plate of the belt guard cover [5260] to the motor bracket [5112, 5114] of the gear unit using screws. Take into account the desired direction of the opening of the belt guard cover [5260]. To adjust the tension of the V-belt, loosen the upper screw [5262] of the backplate of the belt guard cover.
- **Installing the taper bushings [5210, 5212]:**
  - Mount the belt pulleys [5214, 5216] onto motor and gear shaft as closely as possible to the shaft shoulder.
  - Degrease taper bushings [5210, 5212] and belt pulleys [5214, 5216]. Place the taper bushings into the belt pulleys [5214, 5216]. Make sure that the boreholes are aligned.
  - Grease the retaining screws and screw them into the thread of the belt pulley hub.

– Clean motor and gear shaft and insert the complete belt pulleys [5214, 5216].
– Tighten the screws. Tap slightly against the sleeve and retighten the screws. Repeat this procedure several times.
– Make sure that the belt pulleys [5214, 5216] are aligned accurately. Check correct alignment using a steel ruler making contact at four points (→ following figure).



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– Fill the holes with grease to exclude dirt.

- Draw V-belts [5218] over the pulleys [5214, 5216] and tighten the belts using the adjustment screws in the motor bracket (→ Sec. V-belt tightening).
- The maximum permissible error is 1 mm per 1000 mm span of the V-belt. This way, maximum power transmission is ensured and excessive loads on the gear and motor shafts can be prevented.
- **Check belt tension using a V-belt tension meter:**
  – Measure the length of the V-belt span (= free V-belt length)
  – Measure the perpendicular force causing a 16 mm sag per 1000 mm of the belt. Compare the measured values with those listed in Sec. "V-belt tightening".
- Tighten the lock screws for the motor rack and the belt guard rear plate.
- Mount the belt guard cover using the hinge pins. Secure the hinge pins.

V-belt tightening

V-belt profile	∅ d_1 [mm]	Force required to offset the V-belt by 16 mm per 1000 mm span length [N]
SPZ	56 - 95 100 - 140	13 - 20 20 - 25
SPA	80 - 132 140 - 200	25 - 35 35 - 45
SPB	112 - 224 236 - 315	45 - 65 65 - 85
SPC	224 - 355 375 - 560	85 - 115 115 - 150

5.8 Oil heater

Oil heating is required to ensure lubrication at startup when the ambient temperature is low (e.g. cold start of the gear unit).

Purpose and basic design

The oil heater consists of 3 basic parts:

1. Resistor element in the oil bath ("Oil heater") with terminal box
2. Temperature sensor
3. Thermostat

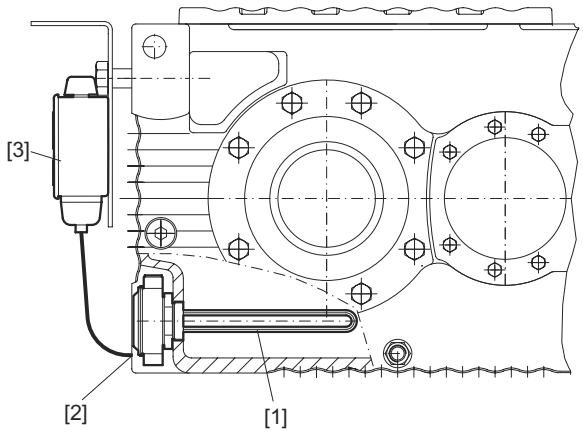

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Figure 60: Oil heater for MC.. series industrial gear units

[1] Oil heater
[2] Temperature sensor
[3] Thermostat

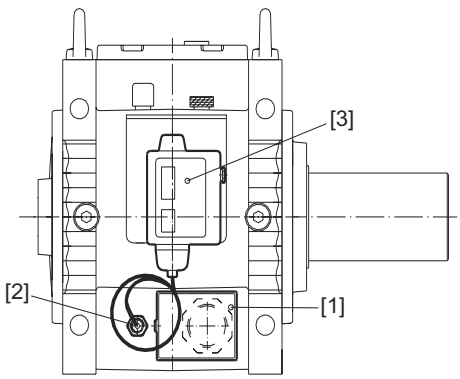

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Figure 61: Position of the temperature sensor in gear unit sizes 04 - 06

[1] Oil heater
[2] Temperature sensor
[3] Thermostat

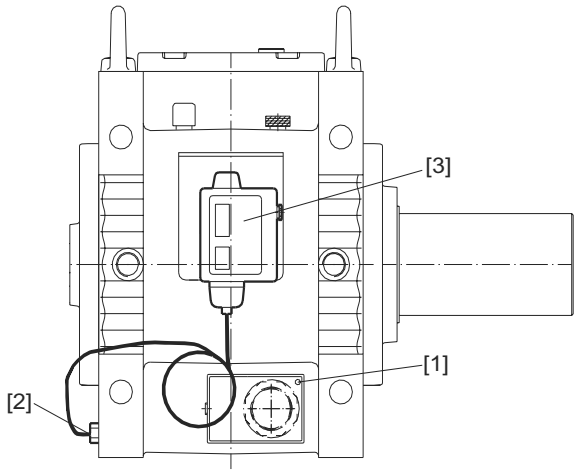

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Figure 62: Position of the temperature sensor in gear unit sizes 07 - 09

[1] Oil heater
[2] Temperature sensor
[3] Thermostat

Activation / deactivation behavior

- The oil heater is activated when the factory set temperature is reached. This temperature setpoint depends on the following:
  - for splash/bath lubricated units: on the pour point of the used oil
  - for pressure lubricated units: on the temperature at which the oil viscosity is maximal 2000 cSt

	Setpoint for splash/bath lubrication [°C]					
ISO VG	**680**	**460**	**320**	**220**	**150**	**100**
Mineral oil	–7	–10	–15	–20	–25	–28
Synthetic oil		–30	–35	–40	–40	–45

	Setpoint for pressure lubrication [°C]					
ISO VG	**680**	**460**	**320**	**220**	**150**	**100**
Mineral oil	+25	+20	+15	+10	+5	
Synthetic oil		+15	+10	+5	0	–5

- Is deactivated when the set temperature is exceeded by 8 to 10°C.

The thermostat and the oil heater are normally installed to the gear unit and are ready to operate but without electrical connections. Therefore, the following has to be done before startup:

1. Connect the resistor element ("Oil heater") with the power supply
2. Connect the thermostat with the power supply

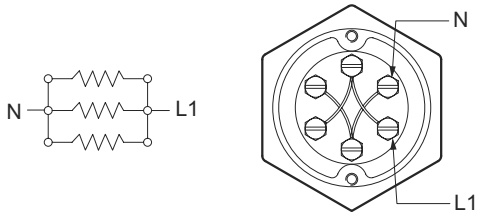
Technical data

Gear unit size	Power consumption oil heater [W]	Voltage supply [V_{AC}]
04 - 06	600	see separate data sheet[1)]
07 - 09	1200	

1) use only voltage specified in separate data sheet.

Electrical connection resistor element

Wiring diagram examples with 230/400 V line voltage



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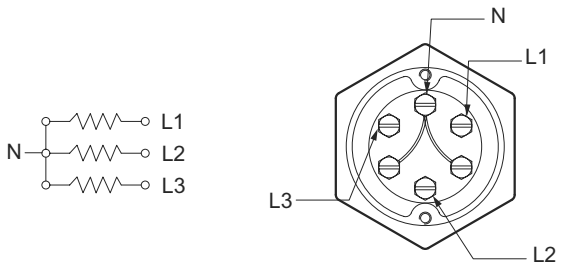
1-phase	
Voltage	230 V
Phase voltage	230 V
Main voltage	400 V
Element voltage	230 V



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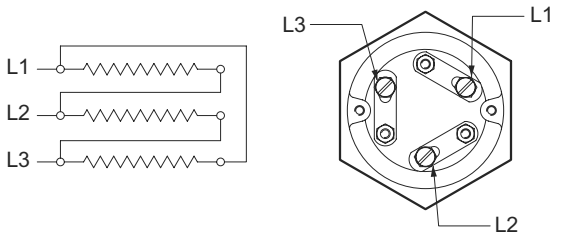
3-phase / star connection	
Voltage	230/400 V
Phase voltage	230 V
Main voltage	400 V
Element voltage	230 V



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3-phase / delta connection	
Voltage	400 V
Main voltage	400 V
Element voltage	400 V

Basic design thermostat

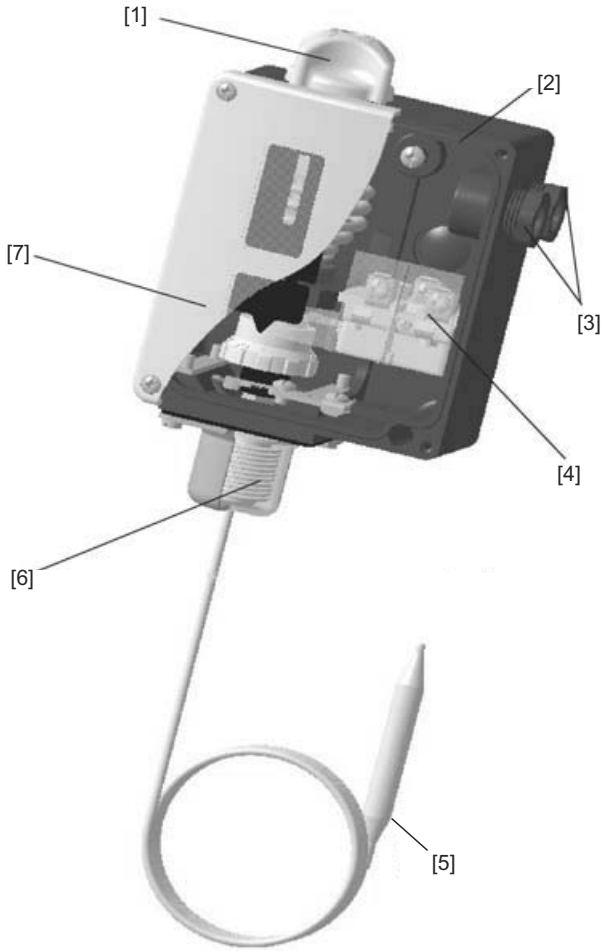

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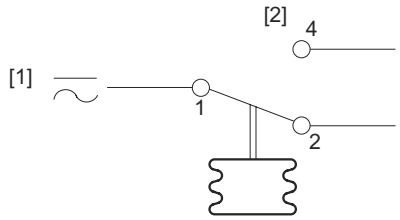
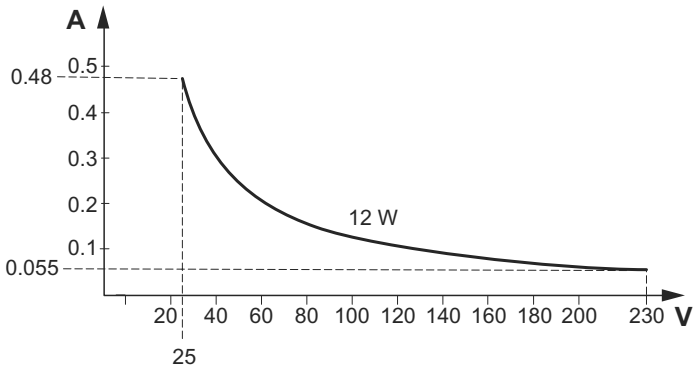
Figure 63: Basic design thermostat (Example)

[1] Setting range knob
[2] IP66 enclosure (units with external reset IP54)
[3] 2 x PG 13.5 cable diameter 6 mm → 14 mm
[4] SPDT contact system. Exchangeable
[5] Capillary tube length up to 10 m
[6] Stainless steel bellows
[7] Polyamide cover

Basic design thermostat

	RT thermostats
Ambient temperature	–50°C to +70°C
Connection diagram	 [1] Line [2] SPDT
Connection data **Contact material:** **AgCdO**	**Alternating current:** AC-1: 10 A, 400 V AC-3: 4 A, 400 V AC-15: 3 A, 400 V **Direct current:** DC-13: 12 W, 230 V 
Cable entry	2 PG 13.5 for 6 -14 mm diameter cable
Enclosure	IP66 acc. to IEC 529 and EN 60529. Units with external reset IP54. Thermostat housing is made of bakelite acc. to DIN 53470, the cover is made of polyamid.

In the following cases, a contactor must be used:

- a 3-phase voltage supply is used
- 2 heating rods are used
- current ratings exceed nominal values of the thermostat

Adjusting the setpoint

The setpoint is normally set at the factory. For adjustments, the following process has to be followed:

The range is set by using the setting knob [1] while at the same time reading the main scale [2]. Tools must be used to set thermostats equipped with a seal cap. The differential is set by the differential disc [3].

The size of the obtained differential can be established by comparing the set main scale value and the scale value on the differential disc with the help of the nomogram for the thermostat concerned.

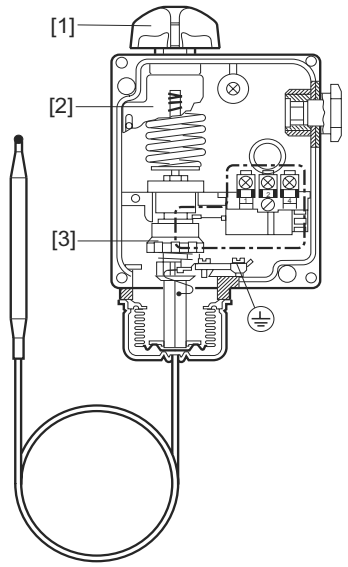


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Figure 64: design thermostat

[1] Setting knob
[2] Main scale
[3] Differential setting disc

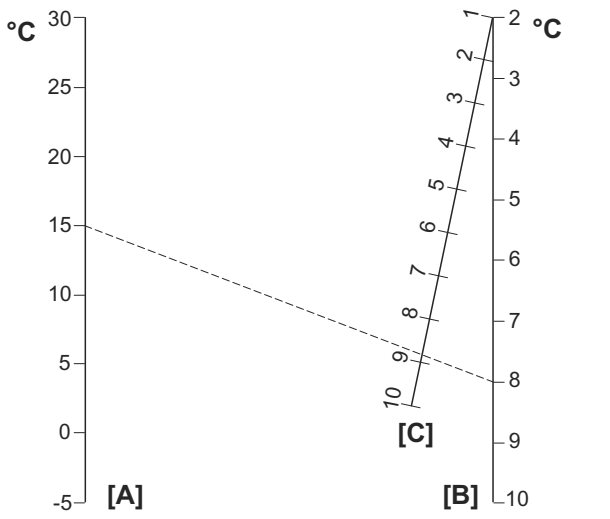

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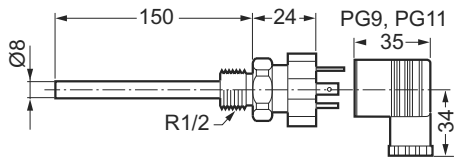
Figure 65: Nomogrceam for obtained differential

[A] Range setting
[B] Obtained differential
[C] Differential setting

5.9 Temperature sensor PT100

The temperature sensor PT100 can be used to measure the temperature of the oil in the gear unit.

Dimensions



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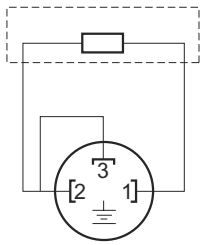
Electrical connection



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Technical data

- Sensor tolerance ±(0.3 + 0.005 x t), (corresponds to DIN IEC 751 class B), t = oil temperature
- Plug connector DIN 43650 PG9 (IP65)
- The tightening torque for the retaining screw in the back of the plug connector for electrical connection is 25 Nm.

5.10 SPM adapter

SPM adapters are available for measuring the shock pulses of the gear unit bearings. Shock pulses are measured using shock pulse sensors attached to the SPM adapter.

Mounting position

MC.R..: An extended SPM adapter [3] is required if a motor flange or fan is used.	**MC.R..:** SPM adapters [1] and [2] are attached on the side of the gear unit, SPM adapter [3] is attached on the pinion housing.	**MC.P..:** SPM adapters [1] and [2] are attached on the side of the gear unit.

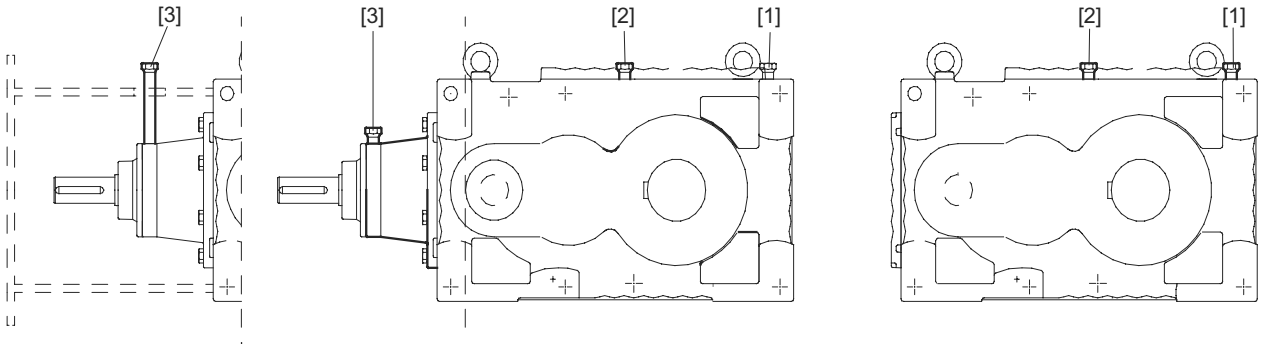

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Figure 66: Mounting positions of SPM adapters

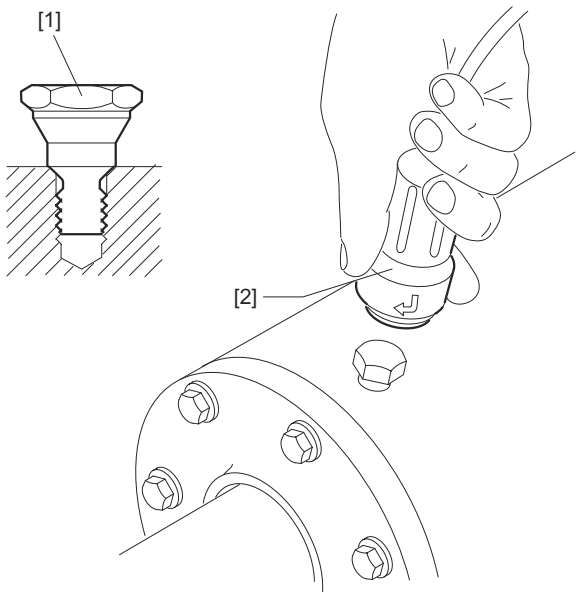

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Figure 67: Mounting the shock pulse sensor onto the SPM adapter

Mounting of shock pulse sensor

- Remove the protection cap of the SPM adapter [1]. Ensure that the SPM adapter [1] is tightened correctly and securely.
- Mount the shock pulse sensor [2] onto the SPM adapter [1].

5.11 Fan

A fan can be mounted if the projected thermal power of the gear unit is exceeded. A fan can be retrofitted if the ambient conditions change after having installed the gear unit. The direction of rotation of the gear unit does not influence the operation of the fan.

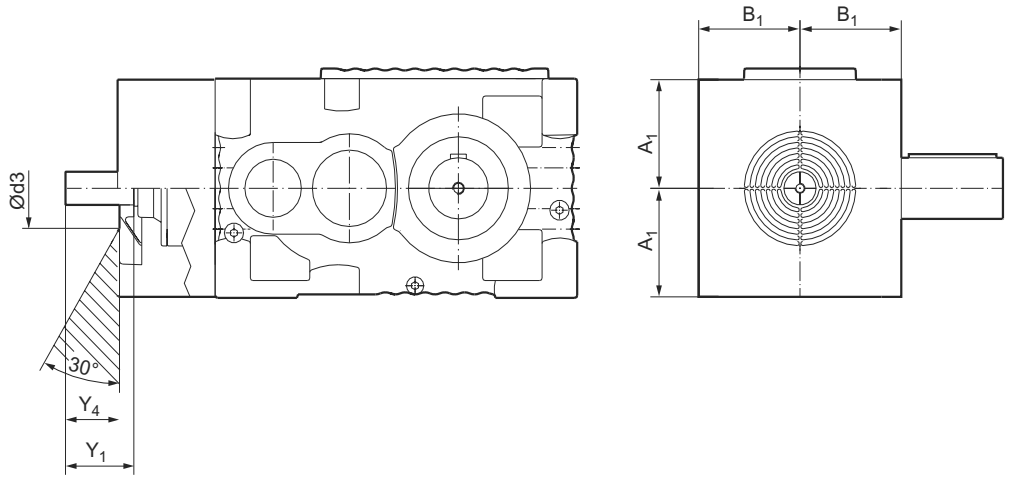


Figure 68: Mounting dimension of the fan

Make sure that air intake vents are not blocked or covered!

Gear unit type	A_1	B_1	Y_4	Y_1	Air intake	
	[mm]				∅ d_3 [mm]	Angle
MC3RL..02	158	160	70	100	109	30°
MC3RL..03	178	165	82	112	131	
MC3RL..04	198	185	90	120	131	
MC3RL..05	213	195	95	125	156	
MC3RL..06	232	220	100	130	156	
MC3RL..07	262	230	105	135	156	
MC3RL..08	297	255	105	135	198	
MC3RL..09	332	265	110	140	226	

5.12 Flow switch

Usage

The flow switch is an electrical switch used for controlling the correct functioning of a pressure lubrication system (→ Shaft end pump; → Motor pump) by checking the oil flow.

In deliveries since March 1st 2005, the flow switch is a standard feature for all gear units supplied with

- a motor pump
- a shaft end pump with a flow rate of 8.5 l/min or higher.

Shaft end pumps with a flow rate below 8.5 l/min are equipped only with a visual flow control device (→ Visual flow indicator) as standard (available as of 2006).

If flow is more than 8,5 l/min, the gear unit is delivered with visual flow control and flow switch (from beginning of year 2006).

Selection

SEW-EURODRIVE selects the flow switch. As standard, a flow switch of the the type DW-R-20 is used. All the following technical data refer to this type.

Function

The flow pushes against a circular plate attached to a pendulum. The pendulum, which is regulated by a spring, moves on its pivot. A magnet attached to the end of the pendulum operates a movable reed contact. The switch unit itself is separated from the oil.

The flow switch has two switching points:

1. Switching point HIGH (upper limit of flow rate) → contact closed - ON
2. Switching point LOW (lower limit of flow rate) → contact open - OFF

Dimensions

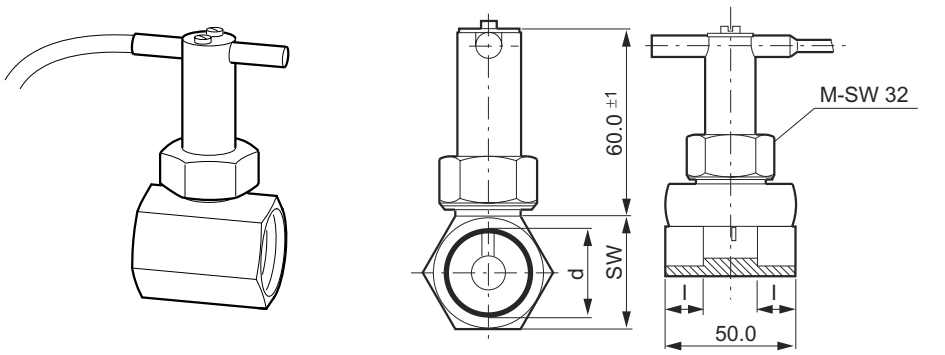


Figure 69: Dimensions

	d Inner thread	NW (rated width)	I	SW	Z	Z	L	H	Z
					[mm]				
Material				A+B+C	A+B	C	D	D	D
Dimension	R ¾ "	20	11	30	50	50	19	109	66

Material abbreviations:

A = Brass

B = Nickel-plated brass

C = Stainless steel

D = Stainless steel / PVC

For determining the exact position of the flow switch, refer to the order-specific dimension drawing

Electrical connection

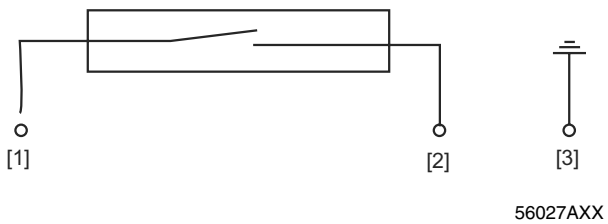


Figure 70: Electrical connection

[1] Brown
[2] Blue
[3] Yellow/green

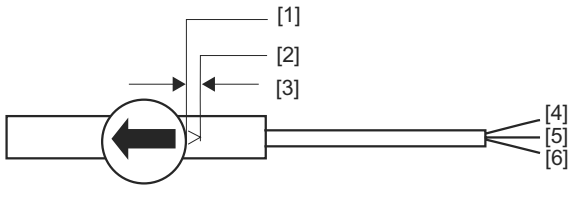


Figure 71: Electrical connection

[1] High switching point
[2] Low switching point
[3] Setting range
[4] Blue
[5] Brown
[6] Yellow/green

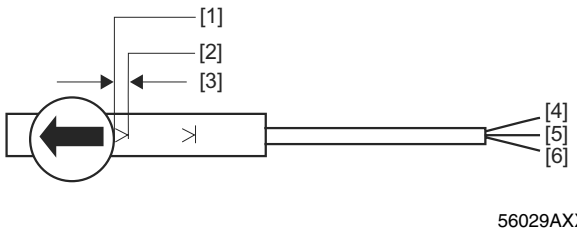


Figure 72: Electrical connection

[1] High switching point
[2] Low switching point
[3] Setting range
[4] Blue
[5] Brown
[6] Yellow/green

Connection data: 230 V; 1.5 A; 80 W, 90 V_{Amax}
Enclosure: IP 65
Maximum temperature of medium: 110°C
Maximum ambient temperature: 70°C
Maximum working pressure: 25 bar
Length of connecting cable: 1.5 m
Switch: You can use the switch as normally closed or normally open contact; SPDT switch available on request
Switch hysteresis: approx. 5 %

Type	Switching point range ON	Switching point range OFF	Maximum flow rate
	[l/min]		
DW-R-20	8.5 - 12.0	6.6 - 11.0	80

5.13 Visual flow indicator

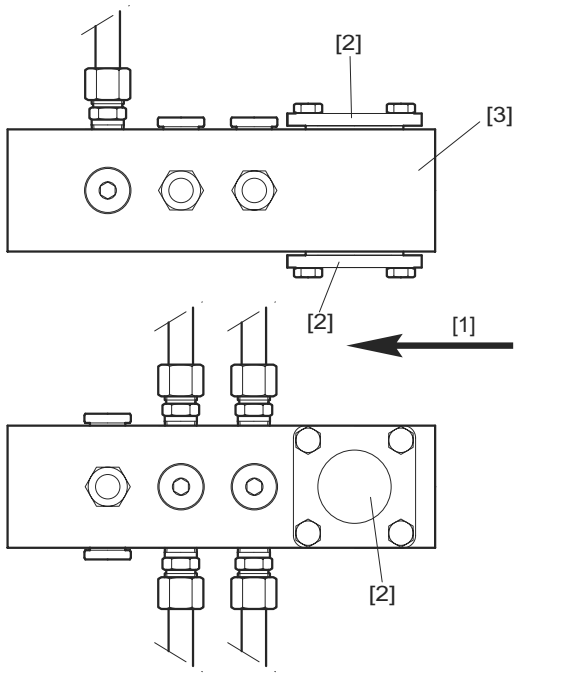


Figure 73: Visual flow indicator

[1] Oil flow direction
[2] glass
[3] Oil distribution block

Usage

The visual flow indicator is a simple method of checking the functioning of a pressure lubrication system by visually checking the oil flow. The visual flow indicator is a standard feature in all gear units with oil pump (as of 2006).

Gear units with oil pump and a flow rate above 8.5 l/min are equipped with an electrical flow switch and visual flow indicator (as of2006).

Function

The oil flow can be seen behind the glass [2]. If no oil is flowing and/or if there are air bubbles in the oil, the function of the pump and suction pipes with connections must be checked.

It is easier to see the oil flow when the two glasses [2] are cleaned and bright light is used on the other side of the oil distribution block.

5.14 Connecting the oil/water cooling system

Follow the instructions in the separate manufacturer's documentation when connecting the oil/water cooling system.

5.15 Connecting the oil/air cooling system

Follow the instructions in the separate manufacturer's documentation when connecting the oil/air cooling system.

5.16 Connecting the motor pump

Follow the instructions in the separate manufacturer's documentation when connecting the motor pump.

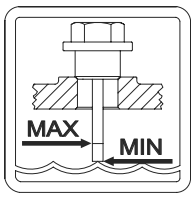
6 Startup

6.1 Startup of MC gear units

- **It is essential to adhere to the safety notes in Sec. "Safety Notes."**
- **It is absolutely necessary to avoid open flames or sparking when working with the gear unit!**
- **Take preventive measures to protect people from the solvent vapors generated by the vapor phase inhibitor!**
- **Before startup, check for correct oil level! For lubricant fill quantities, refer to Sec. "Lubricants."**
- **For gear units with long-term protection: Replace the screw plug on the location indicated by the breather plug (Position → Sec. "Mounting Positions").**
- **If doing maintenance or/and oil-filling activities on the gear unit check the surface temperature in advance. Danger of burns (hot oil inside inside gear unit!)!**

Before startup

- **Remove dust and dirt completely from gear unit surface.**
- **For gear units with long-term protection:** Remove the gear unit from the seaworthy protection box.
- Remove the corrosion protection agent from the gear unit parts. Make sure gaskets, sealing surfaces and sealing lips are not damaged by mechanical abrasion, etc.
- Before filling the gear unit with the correct oil grade and volume, drain the remaining amount of protection oil. To do so, unscrew the oil drain plug and drain the remaining protection oil. Thread the oil drain plug back in place.



- Remove the oil filling plug (Position → Sec. "Mounting Positions"). Use a funnel to fill the oil (filter mesh max. 25 µm). Fill the gear unit with the correct oil grade and volume (→ Sec. "Nameplate"). The oil volume specified on the nameplate of the gear unit is a reference value. **The mark on the dipstick is the decisive indicator of the correct oil level.** Check for correct oil level (= below the "max" mark on the dipstick) using the oil dipstick. After having filled the oil, replace the oil filling plug.
- For gear units with steel oil expansion tank (⟶ 6.3 Startup of MC gear units with steel expansion tank).

- **For gear units with oil sight glass (option): Visually check for correct oil level (= oil is visible in the oil sight glass).**
- Make sure that rotating shafts as well as couplings are equipped with suitable protective covers.
- If the gear unit has a motor pump, check for proper functioning of the pressure lubricating system. Make sure that monitoring devices are connected properly.
- After an extended period of storage (max. two years), have the gear unit operate without load with the correct oil fill (→ Sec. "Nameplate"). This way, the correct functioning of the lubricating system and particularly the oil pump is ensured.
- If the gear unit is equipped with a fan on the input shaft, check for free air intake within the specified angle (→ Sec. "Fan").

Running-in period

SEW-EURODRIVE recommends running-in the gear unit as first startup phase. Increase load and revolutions in two to three steps up to maximum level. The running-in phase takes about 10 hours.

Check the following points during the running-in phase:

- Verify the power values specified on the nameplate because their frequency may be a decisive factor for the service life of the gear unit.
- Does the gear unit run smoothly?
- Are there vibrations or unusual running noise?
- Are there signs of oil leakages on the gear unit?

For further information and troubleshooting, refer to Sec. "Malfunctions."

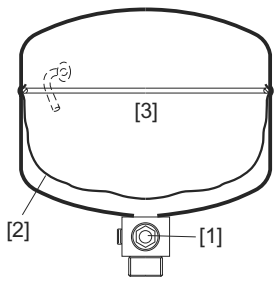
6.2 Startup of MC gear units with backstop

For gear units with backstop, make sure the direction of rotation of the motor is correct!

6.3 Startup of MC gear units with steel oil expansion tank

This chapter describes the procedure for filling oil into gear unit types MC.PV, MC.RV and MC.RE, which are delivered with steel oil expansion tank. Oil filling must be carried out with care to avoid that any air is left in the gear unit. Before filling the gear unit with oil, the membrane in the steel expansion tank must be in down position. During operation of the gear unit, the membrane moves up and down due to the thermal expansion of the oil.

Position of the membrane before startup:



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[1] Oil level

[2] Membrane in down position

[3] Air

If air gets under the membrane in the steel oil expansion tank, it can move the membrane upward thus causing pressure in the gear unit and possibly oil leakage.

The oil must have ambient temperature when filling the gear unit and the gear unit must be installed in its final mounting position. If the gear unit is filled before installation, the gear unit must not be tilted during installation to avoid that oil pushes the membrane upward.

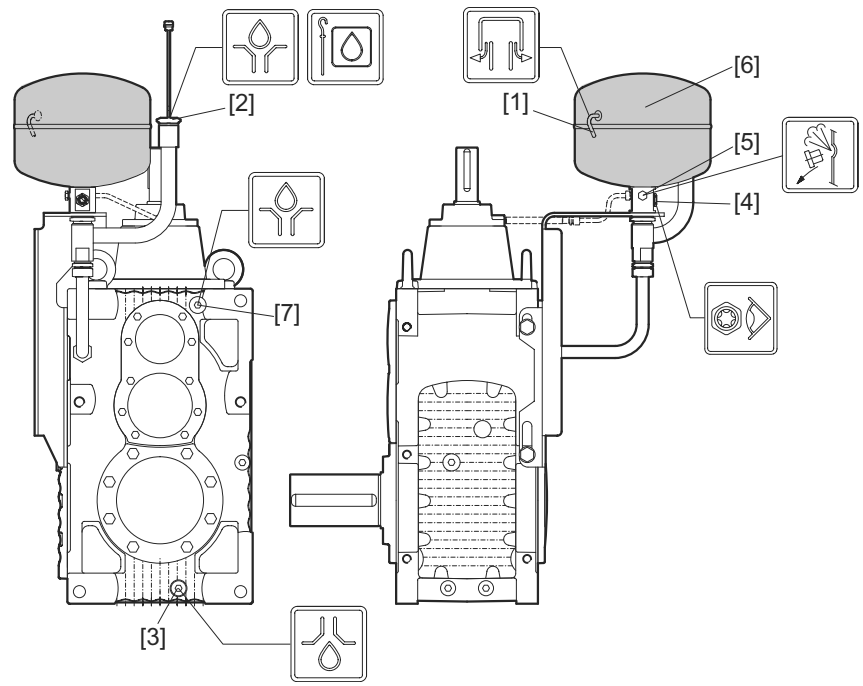

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Figure 74: MC.PE../MC.RE.. industrial gear units with steel oil expansion tank

[1] Breather plug
[2] Oil dipstick and oil filling opening Number 2
[3] Oil drain plug
[4] Oil sight glass
[5] Air outlet screw
[6] Steel oil expansion tank
[7] Oil filling opening Number 1

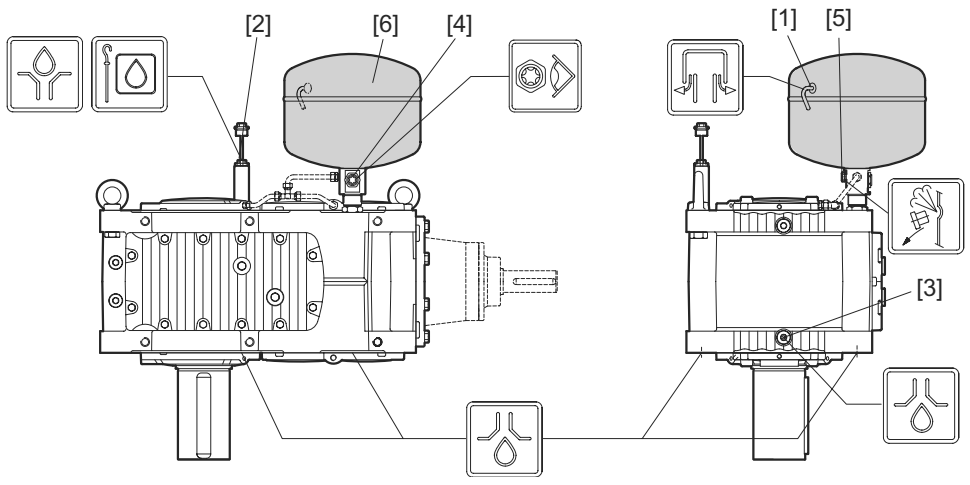

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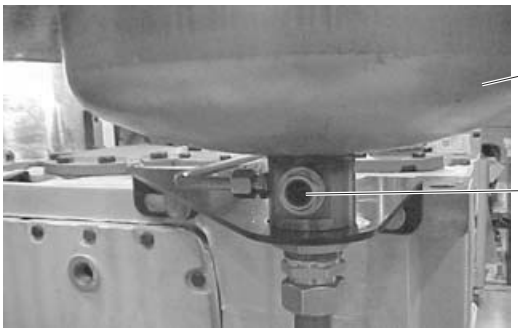
Figure 75: MC.PV../MC.RV.. industrial gear units with steel oil expansion tank

[1] Breather plug
[2] Oil dipstick
[3] Oil drain plug
[4] Oil sight glass
[5] Air outlet screw
[6] Steel oil expansion tank



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1. Open the air outlet screw [5].
2. Open ALL upper screw plugs (usually three to four screw plugs) of the gear unit, such as breather plug, oil filling plug and oil dipstick.
3. Blow compressed air into the oil expansion tank through the breather plug [1]. The membrane goes down (sometimes you can hear a "plob").
4. Fill oil through the oil filling openings [2][7].
5. When the oil reaches the screw plug openings (except for oil dipstick), re-install the screw plugs on the housing. Start the closing process with that plug where the oil reaches the opening first, then close the second plug and so on. The closing process in this order helps to avoid air spots within the gear unit.
6. Fill the gear unit until oil comes out from the air outlet screw [5]. Close the air outlet screw.
7. Fill oil level to the oil sight glass [4].
8. Check the oil level via oil sight glass and oil dipstick to ensure that the oil level keeps stable. The correct oil level is reached, when the oil sight glass is covered half with oil. The marks on the oil sight glass are decisive for the oil level.
9. Screw in the oil dipstick [2].
10. Carry out a test run to ensure that the oil level does not fall below the oil sight glass.
11. Check the oil level only when the gear unit has cooled off to ambient temperature.

Before filling oil into the gear unit, the membrane in the oil expansion tank must be in down position to prevent pressure from building up in the gear unit. Strict observance of the procedure described is a prerequisite for the fulfillment of any warranty claims.

6.4 Taking MC gear units out of operation

Disconnect the drive from voltage supply and secure it to prevent unintentional restart!

If the gear unit is not operated for a longer period of time, you must activate it at regular intervals every two to three (2 to 3) weeks.

If the gear unit is not operated for a period **longer than six (6) months**, additional corrosion protection is required:

- **Corrosion protection for the inside of gear units with splash lubrication or bath lubrication:**

  Fill the gear unit up to the breather plug with the oil grade specified on the nameplate.
- **Corrosion protection for the inside of gear units with oil pressure lubrication:**

  Contact SEW-EURODRIVE in this case!
- **Surface corrosion protection:**

  Apply a wax-based protective coating onto shaft ends and unpainted surfaces as corrosion protection. Grease the sealing lips of the oil seal to protect them from preservative agents.

For taking the gear unit back into operation, refer to Sec. "Startup".

7 Inspection and Maintenance

7.1 Inspection and maintenance intervals

Interval	What to do?
• **Daily**	• Check the housing temperature: – with mineral oil: max 90°C – with synthetic oil: max. 100°C • Check gear unit noise • Check the gear unit for signs of leakage
• **After 500 - 800 hours of operation**	• First oil change after initial startup
• **After 500 hours of operation**	• Check the oil level, refill oil (→ Nameplate) if necessary
• **Every 3000 hours of operation, at least every 6 months**	• Check the oil: If the gear unit is operated outdoors or in humid conditions, check the water content of the oil. The water content must not exceed 0.05 % (500 ppm). • Fill labyrinth seals with grease. Use about 30 g grease per grease nipple. • Clean the breather plug
• **Every 4000 hours of operation**	• For gear units with drywell: Regrease the lower bearings of the LSS
• **Depending on the operating conditions, at the latest every 12 months**	• Change the mineral oil (→ Sec. "Inspection and maintenance of the gear unit") • Check whether retaining screws are tightly secured • Check contamination and condition of the oil/air cooling system • Check the condition of the oil/water cooling system • Clean oil filter, replace filter element if necessary
• **Every 8000 hours of operation, at the latest every 2 years**	
• **Depending on the operating conditions, at the latest every 3 years**	• Change synthetic oil (→ Sec. "Inspection and maintenance of the gear unit")

• **Varying (depending on external factors)**	• Repair or renew the surface/anticorrosion coating
	• Clean the gearcase surface and fan
	• Check the oil heater:
	  • Are all connection cables and terminals tightened securely and free from corrosion?
	  • Clean incrusted elements (such as the heating element) and replace, if required (→ Sec. "Inspection and maintenance of the gear unit")

7.2 Lubricant change intervals

Change the oil more frequently when operating the industrial gear unit under more severe/aggressive environmental conditions!

Mineral CLP lubricants and synthetic polyalphaolefin-based (PAO) lubricants are used for lubrication. The synthetic lubricant CLP HC (according to DIN 51502) shown in the following figure corresponds to the PAO oils.

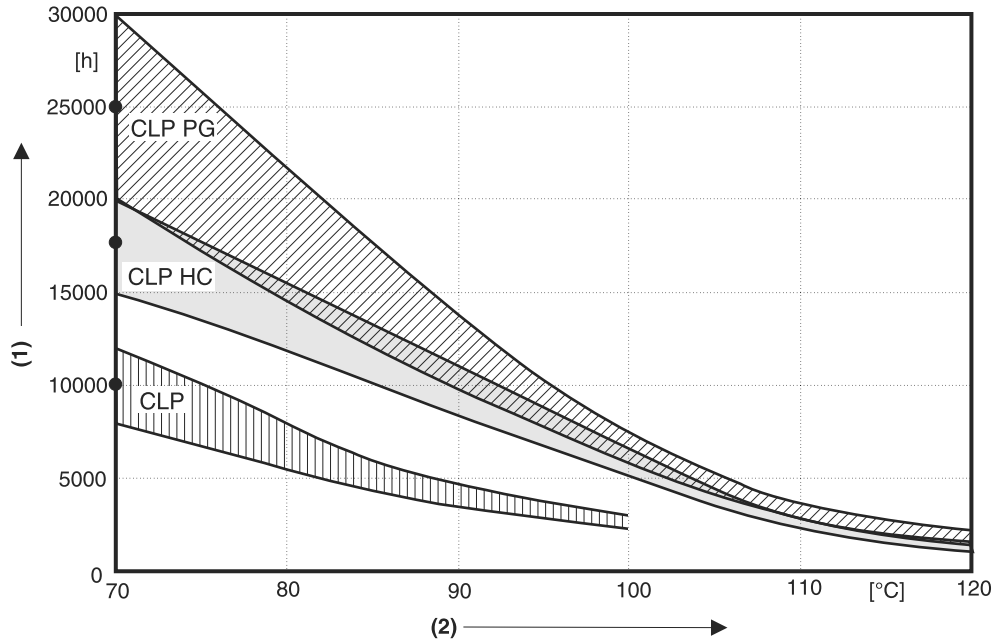


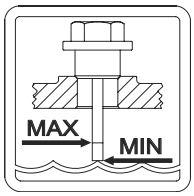
Figure 76: Lubricant change intervals for MC gear units under normal ambient conditions

(1) Hours of operation
(2) Sustained oil bath temperature
• Average value per oil type at 70°C

7.3 Inspection and maintenance of the gear unit

- **Do not mix different synthetic lubricants and do not mix synthetic with mineral lubricants!**
- **For positions of the oil level plug, the drain plug, the breather plug and the oil sight glass, refer to Sec. "Mounting Positions."**

Checking the oil level



1. **Disconnect the motor from voltage supply and secure it to prevent unintentional restart!**

   Wait until the gear unit has cooled off – Danger of burns!
2. For gear units with oil dipstick:
   - Unscrew the oil dipstick and remove it. Clean the dipstick and re-insert it into the gear unit (do **not** screw in tightly!).
   - Remove dipstick again and check oil level. Correct if necessary: the oil level is correct when it is between the oil level mark (= maximum oil level) and the end of the dipstick (= minimum oil level)
3. For gear units with oil sight glass (option): Visually check correct oil level (= middle of oil sight glass)

Checking the oil

1. **Disconnect the motor from voltage supply and secure it to prevent unintentional restart!**

   Wait until the gear unit has cooled off – Danger of burns!
2. Remove some oil from the oil drain plug
3. Check the oil consistency
   - Viscosity
   - If you can see that the oil is heavily contaminated, we recommend to change the oil disregarding the service intervals specified in Sec. "Service and maintenance intervals."

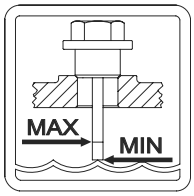
Changing the oil

When changing the oil, clean the gearcase thoroughly to remove oil residues and abrasion. Use the same oil grade as for the operation of the gear unit.

1. **Disconnect the motor from voltage supply and secure it to prevent unintentional restart!**

   Wait until the gear unit has cooled off – Danger of burns! If your gear unit is equipped with an oil expansion tank, let the gear unit cool off until it reaches ambient temperature. The reason is that there might still be oil in the oil expansion tank which might leak through the oil filling hole!

   Note: The gear unit must still be warm because the high viscosity of cold oil will make it more difficult to drain the oil correctly.
2. Place a container under the oil drain plug.
3. Remove oil filling plug, breather plug and oil drain plugs. When using a steel oil expansion tank, also remove the air outlet screw on the air expansion tank. To drain the oil completely, blow air through the breather into the oil expansion tank. As a result, the rubber membrane lowers and forces the remaining oil out. The lowering membrane compensates the pressure, which facilitates filling the new oil.
4. Drain the oil completely.
5. Reinstall the oil drain plugs.



6. Use a funnel to fill the oil (filter mesh max. 25 µm). Fill new oil of the same type as the old oil via the oil filling plug (if you want to change the oil type, contact our customer service first).
   - Fill the oil according to the volume specified on the nameplate (→ Sec. "Nameplate"). The oil volume specified on the nameplate is an approximate value. **The marks on the oil dipstick are decisive for the oil level.**
   - Check whether the oil level is correct using the oil dipstick.
7. Reinstall the oil filling plug. If your gear unit is equipped with a steel oil expansion tank, also screw in the air outlet screw.
8. Mount the breather plug.
9. Clean the oil filter, replace the filter element if necessary (when using an external oil/air or oil/water cooling system).

If you remove the housing cover, you must apply new sealing compound to the sealing surface. Else, the tightness of the gear unit is not guaranteed! Contact SEW-EURODRIVE in this case!

Cleaning the oil heater

Incrustation on the oil heater caused by oil must be removed. Remove the oil heater for this purpose.

Removing the oil heater

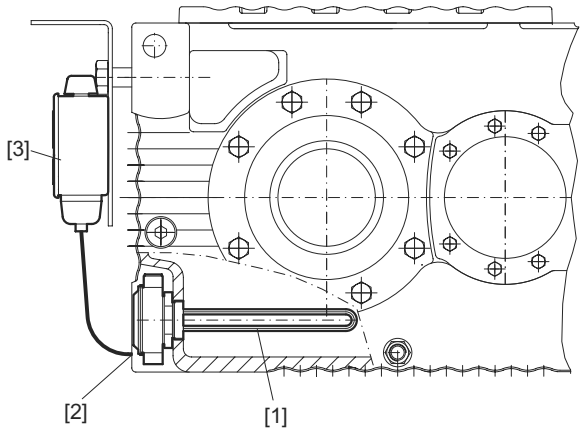


Figure 77: Oil heater for MC.. industrial gear units

[1] Oil heater
[2] Temperature sensor
[3] Thermostat

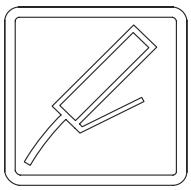
- Remove the oil heater [1] and the gasket on the gear unit.
- Remove the base of the terminal box.
- Clean the tubular heating elements with solvent.

Be careful not to damage the heating elements through scratching or scraping!

Mounting the oil heater

- Reinstall the oil heater [1] and the gasket on the gear unit. The tubular heating elements must always be immersed in liquid.
- Mount the base of the terminal box onto the heating rod using a mounting ring.
- Make sure that the gasket is placed correctly between terminal box and upper end of the heating element.
- Insert the temperature sensor [2] into the oil sump of the gear unit. Set the required temperature on the thermostat [3].

Refilling grease



You can use any lithium-based bearing grease, (some examples see chapter 10.3) to grease the regreasable dust protection covers or labyrinth seals ("Taconite") attached to input and output shafts as option (→ Sec. "Lubricants", "Sealing grease").

For the locations of regreasing points, refer to the order-specific dimension sheet. Use about 30 g grease per grease nipple disregarding the position of regreasing points and gear unit size.

Old grease comes out between shaft and bearing cover lip bringing dirt and sand with it. So the oil seal area can be kept clean. Whipe the bearing cover/shaft clean if there can be seen old grease. Do not use high pressure when filling new grease, press in gently. Do not use more than 30 gramm for one bearing cover.

Vertical gear units with drywell-sealing system on the output shaft

In the drywell version the lower bearings of the low speed shaft are lubricated by grease.

Refer to the regreasing label on the gear unit for the amount of lubricating grease is required for the bearings. Use the correct type of grease per regrease nipple as indicated on the regreasing label and in the grease table → chapter 10

Only to be used for greasing the bearings.

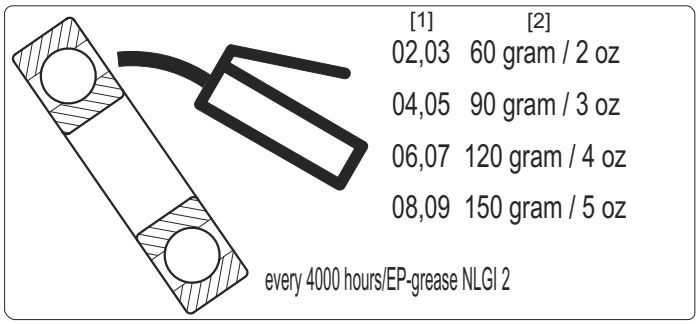
If the gear unit is being stored for a long time, the bearing grease must be replaced before the gear unit is taken into operation.

The bearings must be regreased at regular intervals. Refer to the regreasing label on the gear unit for the required amount of bearing grease and regreasing intervals.

Two types of gear units with drywell are distinguished:

- with extended bearing distance (EBD) type E...G
- with standard bearing arrangement

With extended bearing distance (EBD)/E...G and drywell



57359AEN

Figure 78: Regreasing amount with EBD and drywell (see nameplate MC.V../E..G)

[1] gear unit size (see nameplate)

[2] regreasing amount

Gear unit size MC.V... / E...G	Amount of grease [g]	Regreasing interval
02	60	every 4000 running hours or at least every 10 months
03	60	
04	90	
05	90	
06	120	
07	120	
08	150	
09	150	

With standard bearing arrangement and drywell

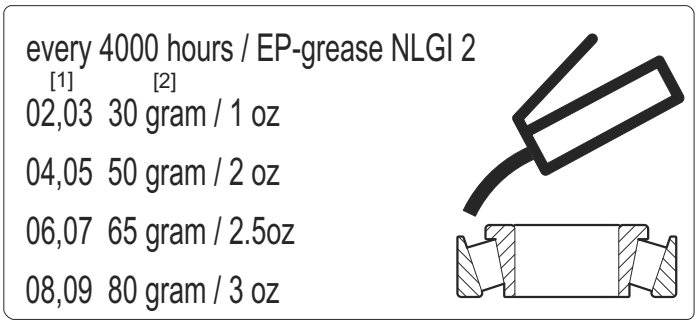


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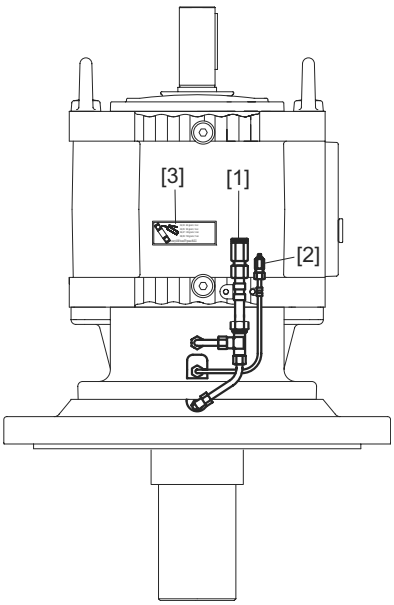
Figure 79: Regreasing amount standard bearing arrangement

[1] gear unit size (see nameplate)

[2] regreasing amount

Gear unit size MC.V...	Amount of grease [g]	regreasing interval
02	30	every 4000 running hours or at least every 10 month
03	30	
04	50	
05	50	
06	65	
07	65	
08	80	
09	80	

Proceed as follows to regrease the bearings:



57378AXX

Figure 80: Regreasing drywell gear units (EBD version shown)

[1] Grease drain pipe
[2] Grease nipple
[3] Label with regreasing amount

- Fill in the grease while the gear unit is in operation
- See the label [3] for the amount of grease

Do not fill in the grease with high pressure!

High pressure causes the grease to come out between shaft seal lip and shaft. As a result, the lipseal might be damaged or move out of place, grease might enter the customer's process and the bearing housing might become corroded inside.

Fill in the grease while the gear unit is running by gently pressing the required amount of grease in.

Do not fill more than mentioned on label!

1. Open the pipe [1]. Old grease will leak out.
2. Fill the grease via the grease nipple [2].
3. Close the drain pipe [1].

8 Malfunctions

8.1 Gear unit malfunctions

Problem	Possible cause	Solution
Unusual, regular running noise	A Meshing/grinding noise: bearing damage B Knocking noise: irregularity in the gearing	A Check the oil (see →Sec. "Inspection and Maintenance), replace bearings B Contact customer service
Unusual, irregular running noise	Foreign particles in the oil	• Check the oil (see Sec. "Inspection and Maintenance") • Stop the drive, contact customer service
Unusual noise in the area of the gear unit mounting	Gear unit mounting has loosened	• Tighten the retaining screws and nuts to the specified torque • Replace the damaged / defective retaining screws or nuts
Operating temperature too high	A Too much oil B Oil too old C Oil contaminated D Gear units with fan: air intake opening / gearcase contaminated E Shaft end pump defective F Malfunctions of oil/air or oil/water cooling system	A Check the oil level, correct if necessary (see Sec. "Inspection and Maintenance") B Check when the oil was changed last time; change oil if necessary (see Sec. "Inspection and Maintenance") C Change the oil (see Sec. "Inspection and Maintenance") D Check the air intake opening and clean if necessary, clean gear unit housing E Check the shaft end pump; replace if necessary F Observe the separate operating instructions of the oil/water and oil/air cooling system!
Bearing point temperatures too high	A Oil not enough B Oil too old C Shaft end pump defective D Bearing damaged	A Check the oil level, correct if necessary (see Sec. "Inspection and Maintenance") B Check when the oil was changed last time; change oil if necessary (see Sec. "Inspection and Maintenance") C Check the shaft end pump; replace if necessary D Check bearing and replace if necessary, contact customer service
Oil leaking[1)] • from cover plate • from gearcase cover • from bearing cover • from mounting flange • from output/input end oil seal	A Gasket on cover plate (MC2P.) / gearcase cover / bearing cover / mounting flange leaking B Sealing lip of oil seal upside down C Oil seal damaged / worn	A Tighten the bolts on the respective cover plate and observe the gear unit. Oil still leaking: contact customer service B Vent the gear unit (see →Sec. "Mounting Positions") Observe the gear unit. Oil still leaking: contact customer service C Contact customer service
Oil leaking • from oil drain plug • from breather plug	A Too much oil B Drive operated in incorrect mounting position C Frequent cold starts (oil foams) and/or high oil level	A Correct the oil level (see Sec. "Inspection and Maintenance) B Mount the breather plug correctly (see Sec. "Mounting Positions") and correct the oil level (see Sec. "Lubricants")
Malfunctions of the oil/air or oil/water cooling system		Observe separate operating instructions of the oil/water and oil/air cooling system!
Operating temperature at backstop too high	Damaged / defective backstop	• Check the backstop; replace if necessary • Contact customer service

1) It is normal for small amounts of oil/grease to emerge from the oil seal during the running-in phase (24 hour running time, see also DIN 3761).

Customer service

Please have the following information available when contacting our customer service:
- Complete nameplate data
- Nature and extent of the fault
- Time of occurrence and accompanying circumstances of the fault
- Presumed cause

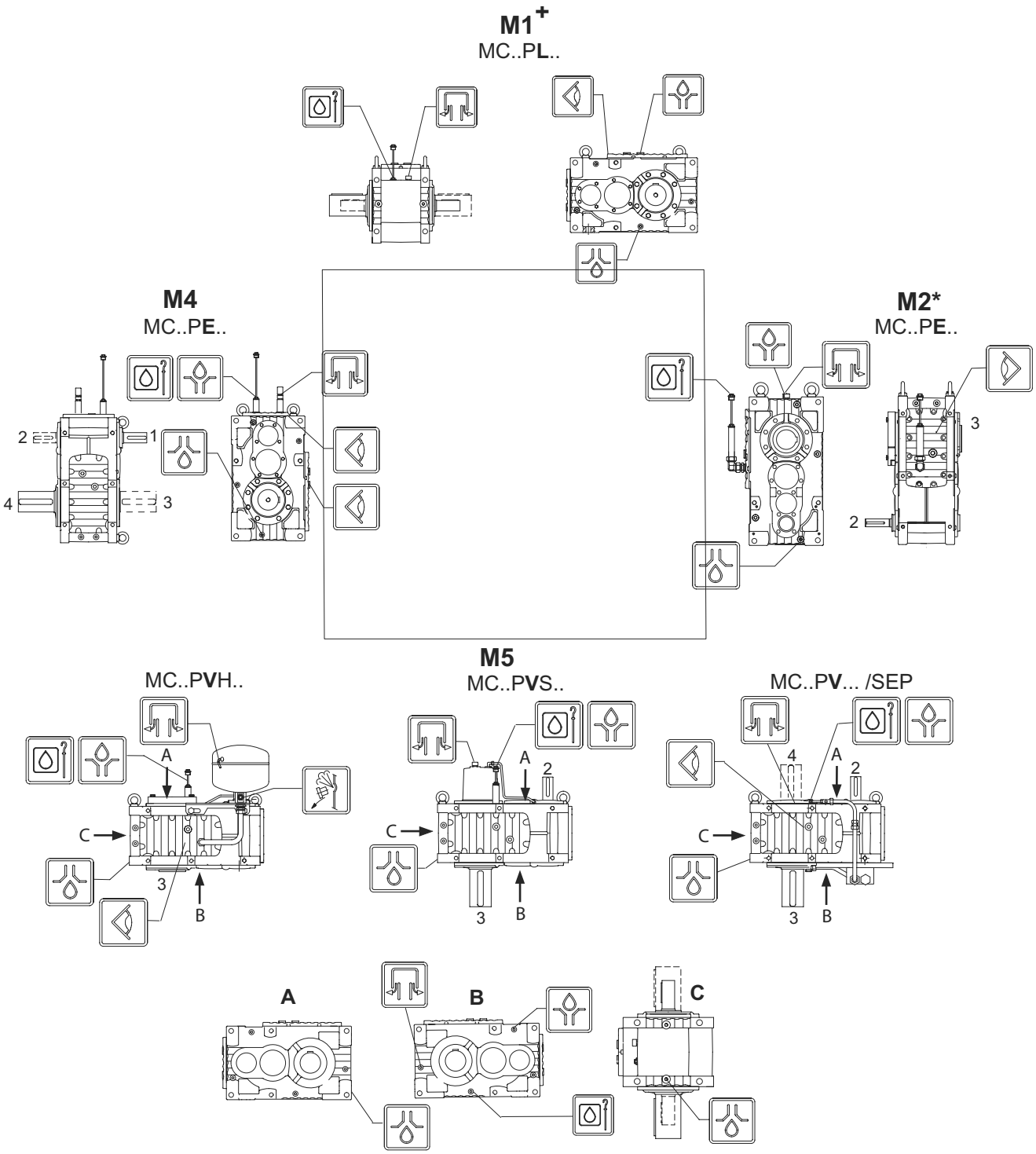
9 Mounting Positions

9.1 Symbols used

The following table shows which symbols are used in the subsequent figures and what they mean.

Symbol	Meaning
	Breather plug
	Air outlet screw
	Inspection opening
	Oil filling plug
	Oil drain plug
	Oil dipstick
	Oil sight glass

9.2 Mounting positions of MC.P.. gear units



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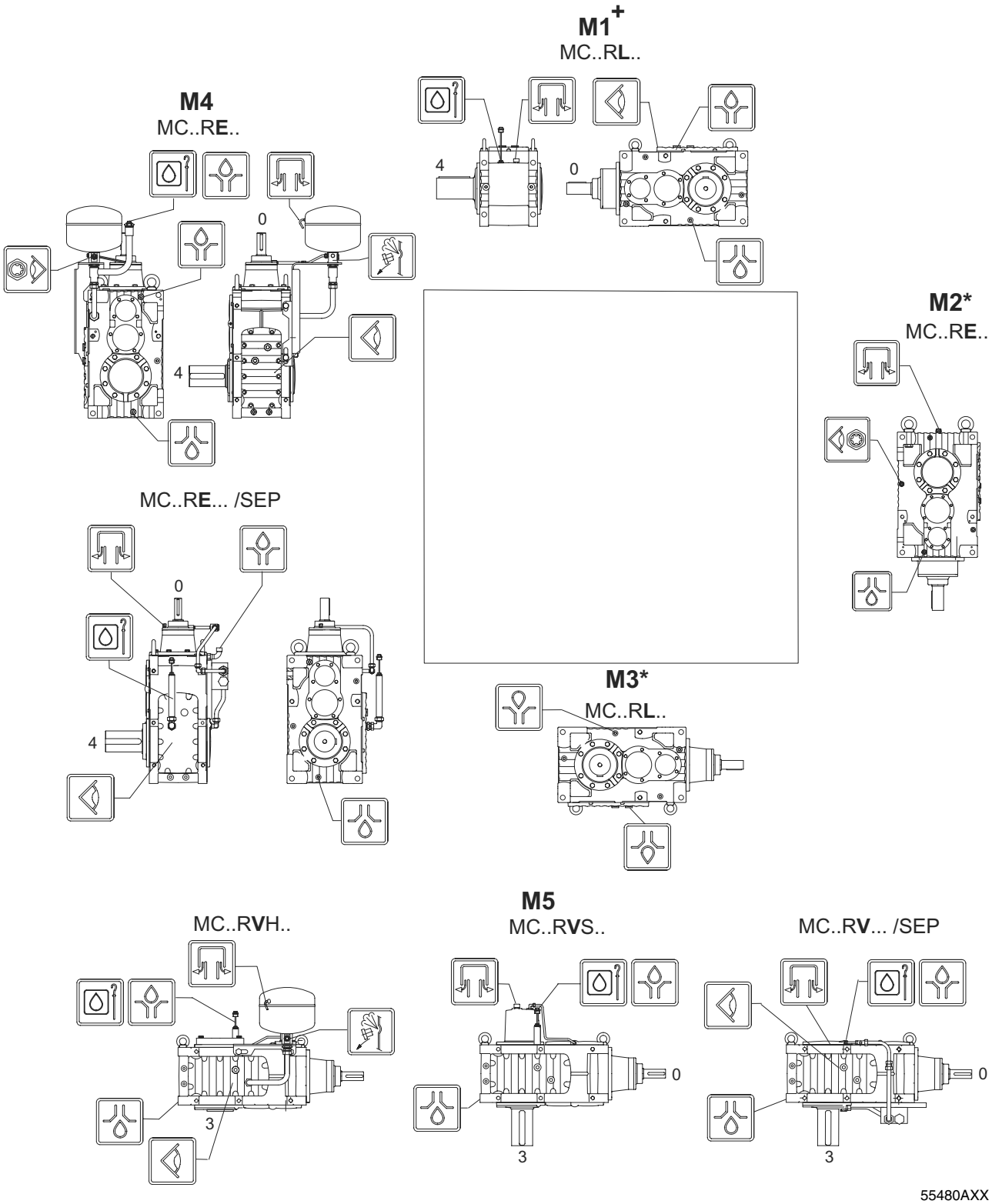
* = Non-standard mounting position / housing orientation. The positions of heater, dipstick, oil drain plug are only exemplary. Refer to the order-specific dimension drawing.

\+ = In horizontal mounting position, the oil drain plug is always located on the opposite side of the output shaft.

9.3 Mounting positions of MC.R.. gear units



* = Non-standard mounting position / housing orientation. The positions of heater, dipstick, oil drain plug are only exemplary. Refer to order-specific dimension drawing.

\+ = In horizontal mounting position, the oil drain plug is always located on the opposite side of the output shaft.

10 Design and Operating Notes

10.1 Guideline for oil selection

General

Unless a special arrangement is made, SEW-EURODRIVE supplies the drives without oil fill.

It is therefore necessary to fill the gear unit with the correct type and quantity of oil before taking it into operation. The required information is indicated on the gear unit nameplate.

The required type and quantity of the gear unit oil depends on the following:

- gear unit size and type
- gear unit design (MC..L.., MC...V.., MC...E) and housing orientation (M1...M6)
- oil operating temperature, which depends on
  - transmitted power
  - ambient temperature
  - lubrication type (splash, bath or pressure lubrication)
  - additional cooling methods
- minimum temperature at cold start

In addition to the required viscosity, the oil must meet the following criteria:

- High viscosity index
- Must contain anti-wear, anti-rust, anti-oxidant and anti-foam additives
- Must also contain pressure-resistant additives (EP additivies)

If synthetic oils are selected due to operating temperatures or oil change intervals, SEW-EURODRIVE recommends polyalfaolefin-based (PAO) oil.

Mineral oils

Standards

Lubricating oils are grouped in ISO VG viscosity classes according to the ISO 3448 and DIN 51519 standards.

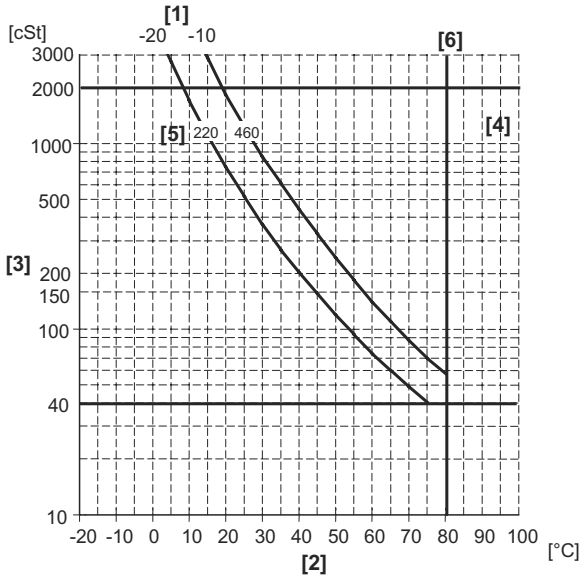
ISO class	ISO 6743-6 designation	DIN 51517-3 designation	AGMA 9005-D94 designation
220	ISO-L-CKC 220	DIN 51517-CLP 220	AGMA 5 EP
460	ISO-L-CKC 460	DIN 51517-CLP 460	AGMA 7 EP

Selecting viscosity of mineral oils

Lubrication method	Ambient temperature	Mineral ISO VG
• **Bath lubrication** • **Splash lubrication** • **Pressure lubrication with oil heater and cooler**	–15...+20°C	220
• **Bath lubrication** • **Splash lubrication** • **Pressure lubrication with oil heater and cooler**	–5...+40°C	460
• **Pressure lubrication with cooler**	+10...+20°C	220
• **Pressure lubrication without cooler**	+20...+40°C	460

Pressure lubrication with or without cooler requires that the situation at cold start is checked! When using an oil pump (pressure lubrication), the starting viscosity must be below 2000 cSt (→ figure 55052AXX).

Use an oil heater (→ chapter 5.8) if necessary.



55052AXX

[1] Pour point [°C]
[2] Gear unit's operating temperature of oil [°C]
[3] Viscosity [cSt]
[4] Viscosity index VI = 90...100
[5] ISO VG
[6] Temperature limitation 80°C

Max. running temperature of gear unit must be noticed. Max allowed running temperature, is 70 deg (long running temp) for ISO VG 220 and 80 deg for ISO VG 460. 90 deg can be used for short periods.

When needed, a cooling device must be used (fan, water/air cooling) or oil changing interval must be shortended (see chapter "Lubrication change interval" in the operating instructions).

Selecting oil type of mineral oils

Select the oil type according to the required viscosity from the table in chapter "10.2 Lubricants."

Synthetic oils

Standard

Lubricating oils are grouped in ISO VG viscosity classes according to the ISO 3448 and DIN 51519 standards.

ISO- L-CKT 460	ISO 6743-6 designation
220	ISO-L-CKT 220
320	ISO-L-CKT 320
460	ISO-L-CKT 460

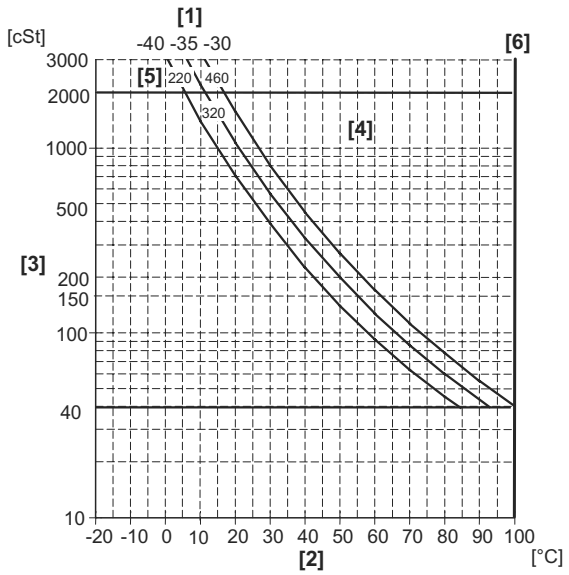
Minimum requirements are the same as for mineral oils

Selecting viscosity of synthetic oils

Lubrication method	Ambient temperature	Synthetic ISO VG
• **Bath lubrication** • **Splash lubrication** • **Pressure lubrication with oil heater and cooler**	–35...+30°C	220
• **Bath lubrication** • **Splash lubrication** • **Pressure lubrication with oil heater and cooler**	–30...+40°C	320
• **Bath lubrication** • **Splash lubrication** • **Pressure lubrication with oil heater and without cooler**	–25...+50°C	460
• **Pressure lubrication with cooler**	+5...+30°C	220
• **Pressure lubrication with cooler**	+10...+40°C	320
• **Pressure lubrication without cooler**	+15...+50°C	460

Pressure lubrication with or without cooler requires that the situation at cold start is checked! When using an oil pump (pressure lubrication), the starting viscosity must be below 2000 cSt (→ 55051AXX).

Use an oil heater (→ chapter 5.8) if necessary.



55051AXX

[1] Pour point [°C]
[2] Gear unit's operating temperature of oil [°C]
[3] Viscosity [cSt]
[4] Viscosity index VI = 140...180
[5] ISO VG
[6] Temperature limitation 100°C

Max. running temperature of gear unit must be noticed.

Viscosity class ISO VG	Max. allowed running temperatures [°C]
220	80
320	90
460	100 (105 for short periods)

When needed, a cooling device must be used (fan, water/air cooling) or oil changing interval must be shortended (see chapter "Lubrication change interval" in the operating instructions).

Selecting oil type of synthetic oils

Select the oil type according to the required viscosity from the table in chapter "10.2 Lubricants".

10.2 Lubricants for MC.. industrial gear units

Lubricant table

The lubricant table on the following page shows the permitted lubricants for SEW-EURODRIVE gear units. Please note the following key to the lubricant table.

Key to the lubricant table

Abbreviations and meaning of shading and notes:

CLP = Mineral oil

CLP PAO = Synthetic polyalphaolefin

= Synthetic lubricant (= synthetic anti-friction bearing grease)

= Mineral lubricant (= mineral-based anti-friction bearing grease)

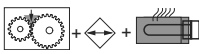
1) = Ambient temperature

= please contact SEW-EURODRIVE

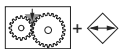
= Lubrication and cooling

= Splash lubrication

= Bath lubrication



= Pressure lubrication with cooler and heater



= Pressure lubrication with cooler (without heater)

Lubricant table

47 0490 005

			ISO VG class	Mobil®	Shell	KLÜBER	ARAL	bp	TEXACO	FUCHS	Q8	Castrol	TOTAL
		CLP	VG 150			KLÜBER GEM 1-150N	Degol BG Plus 150	BP Energol GX-XF 150		Renolin CLP150Plus	Q8 Goya NT 150		
		CLP PAO	VG 150			Klübersynth GEM4-150N	Degol PAS 150 Degol GS 150	Enersyn EP-XF 150 Enersyn SG-XP 150		Renolin Unisyn CLP 150	Q8 ELGRECO 150		Carter SH 150
		CLP	VG 220	Mobilgear XMP220	Omala Oil F220	KLÜBER GEM 1-220N	Degol BG Plus 220	BP Energol GX-XF 220	Meropa 220	Renolin CLP220Plus	Q8 Goya NT 220	Alphamax 220 Tribol 1710/ 220 Optigear BM 220	
		CLP PAO	VG 220	Mobilgear SHC XMP220	Omala Oil HD 220	Klübersynth GEM4-220N	Degol PAS 220 Degol GS220	Enersyn EP -XF 220 Enersyn SG-XP 220	Pinnacle EP 220	Renolin Unisyn CLP 220	Q8 ELGRECO 220	Optigear Synthetic X 220	Carter SH 220
		CLP	VG 320	Mobilgear XMP320	Omala Oil F320	KLÜBER GEM 1-320N	Degol BG Plus 320	BP Energol GX-XF 320	Meropa 320	Renolin CLP320Plus	Q8 Goya NT 320	Alphamax 320 Tribol 1100 / 320 Optigear BM 320	
		CLP PAO	VG 320	Mobilgear SHC XMP320 Mobil SHC 632	Omala Oil HD 320	Klübersynth GEM4-320N	Degol PAS 320 Degol GS 320	Enersyn EP-XF 320 Enersyn SG-XP 320	Pinnacle EP 320	Renolin Unisyn CLP 320	Q8 ELGRECO 320	Tribol 1510/ 320 Tribol 1710/ 320 Optigear Synthetic A320 Optigear Synthetic X 320	Carter SH 320
		CLP	VG 460	Mobilgear XMP460	Omala Oil F460	KLÜBER GEM 1-460N	Degol BG Plus 460	BP Energol GX-XF 460	Meropa 460	Renolin CLP460Plus	Q8 Goya NT 460	Alphamax 460 Tribol 1100 / 460 Optigear BM 460	
		CLP PAO	VG 460	Mobilgear SHC XMP460 Mobil SHC 634	Omala Oil HD 460	Klübersynth GEM4-460N	Degol PAS 460 Degol GS 460	Enersyn EP -XF 460 Enersyn SG -XP 460	Pinnacle EP 460	Renolin Unisyn CLP 460	Q8 ELGRECO 460	Tribol 1510/ 460 Tribol 1710/ 460 Optigear Synthetic A460 Optigear Synthetic X 460	Carter SH 460
		CLP	VG 680	Mobilgear XMP680		KLÜBER GEM 1-680N	Degol BG Plus 680	BP Energol GX-XF 680	Meropa 680		Q8 Goya NT 680	Tribol 1100 / 680 Optigear BM 680	Renolin CLP680
MC..P	1) °C -40 0 +50												

10.3 Grease

The below mentioned greases can be used as

- Sealing grease
- Bearing grease for the lower LSS-bearings for gear units with drywell sealing system

SEW-EURODRIVE recommends the grease types listed in below table for operating temperatures from – 30°C to +100°C.

Lubricating grease properties:

- Contains EP additives
- Hardness class NLGI2

Company	Oil
Aral	Aralub HLP2
BP	Energrease LS-EPS
Castrol	Spheerol EPL2
Chevron	Dura-Lith EP2
Elf	Epexa EP2
Esso	Beacon EP2
Exxon	Beacon EP2
Gulf	Gulf crown Grease 2
Klüber	Centoplex EP2
Kuwait	Q8 Rembrandt EP2
Mobil	Mobilux EP2
Molub	Alloy BRB-572
Optimol	Olista Longtime 2
Shell	Alvania EP2
Texaco	Multifak EP2
Total	Multis EP2
Tribol	Tribol 3030-2

10.4 Lubricant fill quantities

The specified fill quantities are guide values. The precise values vary depending on the gear ratio.

MC.P.

Gear unit size	Lubrication type	Oil volume [l]					
		Two stages			Three stages		
		Mounting position					
		L	V	E	L	V	E
02	Splash Bath	9 -	- 21	- 18	11 -	- 25	- 20
03	Splash Bath	14 -	- 26	- 23	15 -	- 31	- 32
04	Splash Bath	18 -	- 34	- 31	20 -	- 45	- 45
05	Splash Bath	24 -	- 45	- 35	27 -	- 58	- 54
06	Splash Bath	28 -	- 58	- 45	36 -	- 73	- 65
07	Splash Bath	33 -	- 94	- 59	47 -	- 102	- 89
08	Splash Bath	55 -	- 117	- 77	68 -	- 133	- 113
09	Splash Bath	79 -	- 139	- 107	90 -	- 151	- 137

MC.R.

Gear unit size	Lubrication type	Oil volume [l]					
		Two stages			Three stages		
		Mounting position					
		L	V	E	L	V	E
02	Splash Bath	10 -	- 19	- 18	10 -	- 19	- 19
03	Splash Bath	14 -	- 27	- 29	13 -	- 27	- 28
04	Splash Bath	19 -	- 34	- 34	18 -	- 34	- 35
05	Splash Bath	22 -	- 47	- 47	24 -	- 47	- 47
06	Splash Bath	26 -	- 59	- 60	28 -	- 59	- 61
07	Splash Bath	32 -	- 89	- 91	33 -	- 88	- 89
08	Splash Bath	58 -	- 111	- 119	56 -	- 111	- 116
09	Splash Bath	84 -	- 137	- 133	79 -	- 137	- 137

When using pressure lubrication, it is essential to observe the specifications on the nameplate and in the order-specific documentation!

11 Change Index

11.1 Changes to the previous edition

The following section lists the changes made to the individual sections from edition 07/2003, publication number 10560009.

Safety notes

- The subsection "Corrosion and surface correction" has been revised.

Unit design

- The nameplates for "Industrial gear units MC.., SEW-EURODRIVE" have been revised in the subsection "Unit designations, nameplates."
- The subsections
  - "Mounting positions"
  - "Mounting surface"
  - "Housing orientation"
  - "Shaft positions"

  have been added.

Mechanical installation

- In the subsection "Gear unit foundation", the "Tightening torques" table has been revised.
- In the subsection "Gear unit foundation", the "Connecting flange" and "EBD connecting flange" have been added.
- The subsection "Mounting/removing hollow shaft gear units with shrink disc" has been completely revised.

Mechanical installation options

- In the subsection "Mounting couplings", the "Flexible jaw ouplings type MT, MS-MTN" has been included.
- The subsection "Shaft end pump SHP" has been included.
- The subsection "Mounting of V-belt drive" has been changed.
- The subsection "Oil heater" was been revised.
- The subsection "Flow switch" has been included.
- The subsection "Visual flow indicator" has been included.

Startup

- The subsection "Startup of MC gear units with steel oil expansion tank" has been included.

Inspection and maintenance

- In the subsection "Inspection / maintenance of the gear unit", the "Vertical gear unit with Drywell sealing system on the LSS" has been included.

Mounting positions

- The section "Mounting positions" has been completely revised.

Design and operating notes

- The section "Design and operating notes" has been completely revised.

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Service **Competence Center**	**Central** Gear units / Motors	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 1 D-76676 Graben-Neudorf	Tel. +49 7251 75-1710 Fax +49 7251 75-1711 sc-mitte-gm@sew-eurodrive.de
	Central Electronics	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal	Tel. +49 7251 75-1780 Fax +49 7251 75-1769 sc-mitte-e@sew-eurodrive.de
	North	SEW-EURODRIVE GmbH & Co KG Alte Ricklinger Straße 40-42 D-30823 Garbsen (near Hannover)	Tel. +49 5137 8798-30 Fax +49 5137 8798-55 sc-nord@sew-eurodrive.de
	East	SEW-EURODRIVE GmbH & Co KG Dänkritzer Weg 1 D-08393 Meerane (near Zwickau)	Tel. +49 3764 7606-0 Fax +49 3764 7606-30 sc-ost@sew-eurodrive.de
	South	SEW-EURODRIVE GmbH & Co KG Domagkstraße 5 D-85551 Kirchheim (near München)	Tel. +49 89 909552-10 Fax +49 89 909552-50 sc-sued@sew-eurodrive.de
	West	SEW-EURODRIVE GmbH & Co KG Siemensstraße 1 D-40764 Langenfeld (near Düsseldorf)	Tel. +49 2173 8507-30 Fax +49 2173 8507-55 sc-west@sew-eurodrive.de
	Drive Service Hotline / 24 Hour Service		+49 180 5 SEWHELP +49 180 5 7394357
	Additional addresses for service in Germany provided on request!		

France			
Production **Sales** **Service**	**Haguenau**	SEW-USOCOME 48-54, route de Soufflenheim B. P. 20185 F-67506 Haguenau Cedex	Tel. +33 3 88 73 67 00 Fax +33 3 88 73 66 00 http://www.usocome.com sew@usocome.com
Assembly **Sales** **Service**	**Bordeaux**	SEW-USOCOME Parc d'activités de Magellan 62, avenue de Magellan - B. P. 182 F-33607 Pessac Cedex	Tel. +33 5 57 26 39 00 Fax +33 5 57 26 39 09
	Lyon	SEW-USOCOME Parc d'Affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. +33 4 72 15 37 00 Fax +33 4 72 15 37 15
	Paris	SEW-USOCOME Zone industrielle 2, rue Denis Papin F-77390 Verneuil l'Etang	Tel. +33 1 64 42 40 80 Fax +33 1 64 42 40 88
	Additional addresses for service in France provided on request!		

Algeria			
Sales	**Alger**	Réducom 16, rue des Frères Zaghnoun Bellevue El-Harrach 16200 Alger	Tel. +213 21 8222-84 Fax +213 21 8222-84

Argentina			
Assembly **Sales** **Service**	**Buenos Aires**	SEW EURODRIVE ARGENTINA S.A. Centro Industrial Garin, Lote 35 Ruta Panamericana Km 37,5 1619 Garin	Tel. +54 3327 4572-84 Fax +54 3327 4572-21 sewar@sew-eurodrive.com.ar

Australia			
Assembly **Sales** **Service**	**Melbourne**	SEW-EURODRIVE PTY. LTD. 27 Beverage Drive Tullamarine, Victoria 3043	Tel. +61 3 9933-1000 Fax +61 3 9933-1003 http://www.sew-eurodrive.com.au enquires@sew-eurodrive.com.au
	Sydney	SEW-EURODRIVE PTY. LTD. 9, Sleigh Place, Wetherill Park New South Wales, 2164	Tel. +61 2 9725-9900 Fax +61 2 9725-9905 enquires@sew-eurodrive.com.au

Austria			
Assembly **Sales** **Service**	**Wien**	SEW-EURODRIVE Ges.m.b.H. Richard-Strauss-Strasse 24 A-1230 Wien	Tel. +43 1 617 55 00-0 Fax +43 1 617 55 00-30 http://sew-eurodrive.at sew@sew-eurodrive.at

Belgium			
Assembly **Sales** **Service**	**Brüssel**	SEW Caron-Vector S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.caron-vector.be info@caron-vector.be

Brazil			
Production **Sales** **Service**	**Sao Paulo**	SEW-EURODRIVE Brasil Ltda. Avenida Amâncio Gaiolli, 50 Caixa Postal: 201-07111-970 Guarulhos/SP - Cep.: 07251-250	Tel. +55 11 6489-9133 Fax +55 11 6480-3328 http://www.sew.com.br sew@sew.com.br
	Additional addresses for service in Brazil provided on request!		

Bulgaria			
Sales	**Sofia**	BEVER-DRIVE GmbH Bogdanovetz Str.1 BG-1606 Sofia	Tel. +359 2 9532565 Fax +359 2 9549345 bever@fastbg.net

Cameroon			
Sales	**Douala**	Electro-Services Rue Drouot Akwa B.P. 2024 Douala	Tel. +237 4322-99 Fax +237 4277-03

Canada			
Assembly **Sales** **Service**	**Toronto**	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, Ontario L6T3W1	Tel. +1 905 791-1553 Fax +1 905 791-2999 http://www.sew-eurodrive.ca l.reynolds@sew-eurodrive.ca
	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. 7188 Honeyman Street Delta. B.C. V4G 1 E2	Tel. +1 604 946-5535 Fax +1 604 946-2513 b.wake@sew-eurodrive.ca
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger Street LaSalle, Quebec H8N 2V9	Tel. +1 514 367-1124 Fax +1 514 367-3677 a.peluso@sew-eurodrive.ca
	Additional addresses for service in Canada provided on request!		

Chile			
Assembly **Sales** **Service**	**Santiago de Chile**	SEW-EURODRIVE CHILE LTDA. Las Encinas 1295 Parque Industrial Valle Grande LAMPA RCH-Santiago de Chile P.O. Box Casilla 23 Correo Quilicura - Santiago - Chile	Tel. +56 2 75770-00 Fax +56 2 75770-01 ventas@sew-eurodrive.cl

China			
Production **Assembly** **Sales** **Service**	**Tianjin**	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 46, 7th Avenue, TEDA Tianjin 300457	Tel. +86 22 25322612 Fax +86 22 25322611 gm-tianjin@sew-eurodrive.cn http://www.sew.com.cn

China			
Assembly **Sales** **Service**	**Suzhou**	SEW-EURODRIVE (Suzhou) Co., Ltd. 333, Suhong Middle Road Suzhou Industrial Park Jiangsu Province, 215021 P. R. China	Tel. +86 512 62581781 Fax +86 512 62581783 suzhou@sew.com.cn
	Additional addresses for service in China provided on request!		

Colombia			
Assembly **Sales** **Service**	**Bogotá**	SEW-EURODRIVE COLOMBIA LTDA. Calle 22 No. 132-60 Bodega 6, Manzana B Santafé de Bogotá	Tel. +57 1 54750-50 Fax +57 1 54750-44 sewcol@sew-eurodrive.com.co

Croatia			
Sales **Service**	**Zagreb**	KOMPEKS d. o. o. PIT Erdödy 4 II HR 10 000 Zagreb	Tel. +385 1 4613-158 Fax +385 1 4613-158 kompeks@net.hr

Czech Republic			
Sales	**Praha**	SEW-EURODRIVE CZ S.R.O. Business Centrum Praha Luná 591 CZ-16000 Praha 6 - Vokovice	Tel. +420 a220121236 Fax +420 220121237 http://www.sew-eurodrive.cz sew@sew-eurodrive.cz

Denmark			
Assembly **Sales** **Service**	**Kopenhagen**	SEW-EURODRIVEA/S Geminivej 28-30, P.O. Box 100 DK-2670 Greve	Tel. +45 43 9585-00 Fax +45 43 9585-09 http://www.sew-eurodrive.dk sew@sew-eurodrive.dk

Estonia			
Sales	**Tallin**	ALAS-KUUL AS Paldiski mnt.125 EE 0006 Tallin	Tel. +372 6593230 Fax +372 6593231 veiko.soots@alas-kuul.ee

Finland			
Assembly **Sales** **Service**	**Lahti**	SEW-EURODRIVE OY Vesimäentie 4 FIN-15860 Hollola 2	Tel. +358 201 589-300 Fax +358 3 780-6211 http://www.sew-eurodrive.fi sew@sew.fi

Gabon			
Sales	**Libreville**	Electro-Services B.P. 1889 Libreville	Tel. +241 7340-11 Fax +241 7340-12

Great Britain			
Assembly **Sales** **Service**	**Normanton**	SEW-EURODRIVE Ltd. Beckbridge Industrial Estate P.O. Box No.1 GB-Normanton, West- Yorkshire WF6 1QR	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk

Greece			
Sales **Service**	**Athen**	Christ. Boznos & Son S.A. 12, Mavromichali Street P.O. Box 80136, GR-18545 Piraeus	Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 http://www.boznos.gr info@boznos.gr

Hong Kong			
Assembly **Sales** **Service**	**Hong Kong**	SEW-EURODRIVE LTD. Unit No. 801-806, 8th Floor Hong Leong Industrial Complex No. 4, Wang Kwong Road Kowloon, Hong Kong	Tel. +852 2 7960477 + 79604654 Fax +852 2 7959129 sew@sewhk.com

Hungary			
Sales **Service**	**Budapest**	SEW-EURODRIVE Kft. H-1037 Budapest Kunigunda u. 18	Tel. +36 1 437 06-58 Fax +36 1 437 06-50 office@sew-eurodrive.hu

India			
Assembly **Sales** **Service**	**Baroda**	SEW-EURODRIVE India Pvt. Ltd. Plot No. 4, Gidc Por Ramangamdi · Baroda - 391 243 Gujarat	Tel. +91 265 2831086 Fax +91 265 2831087 mdoffice@seweurodriveindia.com
Technical Offices	**Bangalore**	SEW-EURODRIVE India Private Limited 308, Prestige Centre Point 7, Edward Road Bangalore	Tel. +91 80 22266565 Fax +91 80 22266569 salesbang@seweurodriveinindia.com

Ireland			
Sales **Service**	**Dublin**	Alperton Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458

Israel			
Sales	**Tel-Aviv**	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 lirazhandasa@barak-online.net

Italy			
Assembly **Sales** **Service**	**Milano**	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano)	Tel. +39 02 96 9801 Fax +39 02 96 799781 sewit@sew-eurodrive.it

Ivory Coast			
Sales	**Abidjan**	SICA Ste industrielle et commerciale pour l'Afrique 165, Bld de Marseille B.P. 2323, Abidjan 08	Tel. +225 2579-44 Fax +225 2584-36

Japan			
Assembly **Sales** **Service**	**Toyoda-cho**	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373814 sewjapan@sew-eurodrive.co.jp

Korea			
Assembly **Sales** **Service**	**Ansan-City**	SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate Unit 1048-4, Shingil-Dong Ansan 425-120	Tel. +82 31 492-8051 Fax +82 31 492-8056 master@sew-korea.co.kr

Latvia			
Sales	**Riga**	SIA Alas-Kuul Katlakalna 11C LV-1073 Riga	Tel. +371 7139386 Fax +371 7139386 info@alas-kuul.ee

Lebanon			
Sales	**Beirut**	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 4947-86 +961 1 4982-72 +961 3 2745-39 Fax +961 1 4949-71 gacar@beirut.com

Lithuania			
Sales	**Alytus**	UAB Irseva Naujoji 19 LT-62175 Alytus	Tel. +370 315 79204 Fax +370 315 56175 info@irseva.lt http://www.sew-eurodrive.lt

Luxembourg			
Assembly **Sales** **Service**	**Brüssel**	CARON-VECTOR S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.caron-vector.be info@caron-vector.be

Malaysia			
Assembly **Sales** **Service**	**Johore**	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 sales@sew-eurodrive.com.my

Mexico			
Assembly **Sales** **Service**	**Queretaro**	SEW-EURODRIVE, Sales and Distribution, S. A. de C. V. Privada Tequisquiapan No. 102 Parque Ind. Queretaro C. P. 76220 Queretaro, Mexico	Tel. +52 442 1030-300 Fax +52 442 1030-301 scmexico@seweurodrive.com.mx

Morocco			
Sales	**Casablanca**	S. R. M. Société de Réalisations Mécaniques 5, rue Emir Abdelkader 05 Casablanca	Tel. +212 2 6186-69 + 6186-70 + 6186-71 Fax +212 2 6215-88 srm@marocnet.net.ma

Netherlands			
Assembly **Sales** **Service**	**Rotterdam**	VECTOR Aandrijftechniek B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 http://www.vector.nu info@vector.nu

New Zealand			
Assembly **Sales** **Service**	**Auckland**	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. +64 9 2745627 Fax +64 9 2740165 sales@sew-eurodrive.co.nz
	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz

Norway			
Assembly **Sales** **Service**	**Moss**	SEW-EURODRIVE A/S Solgaard skog 71 N-1599 Moss	Tel. +47 69 241-020 Fax +47 69 241-040 sew@sew-eurodrive.no

Peru			
Assembly **Sales** **Service**	**Lima**	SEW DEL PERU MOTORES REDUCTORES S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 sewperu@sew-eurodrive.com.pe

Poland			
Assembly **Sales** **Service**	**Lodz**	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 PL-92-518 Lodz	Tel. +48 42 67710-90 Fax +48 42 67710-99 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl

Portugal			
Assembly **Sales** **Service**	**Coimbra**	SEW-EURODRIVE, LDA. Apartado 15 P-3050-901 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt

Romania			
Sales **Service**	**Bucuresti**	Sialco Trading SRL str. Madrid nr.4 011785 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 sialco@sialco.ro

Russia			
Assembly **Sales** **Service**	**St. Petersburg**	ZAO SEW-EURODRIVE P.O. Box 36 195220 St. Petersburg Russia	Tel. +7 812 3332522 +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru

Senegal			
Sales	**Dakar**	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 849 47-70 Fax +221 849 47-71 senemeca@sentoo.sn

Serbia and Montenegro			
Sales	**Beograd**	DIPAR d.o.o. Kajmakcalanska 54 SCG-11000 Beograd	Tel. +381 11 3088677 / +381 11 3088678 Fax +381 11 3809380 dipar@yubc.net

Singapore			
Assembly **Sales** **Service**	**Singapore**	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 sewsingapore@sew-eurodrive.com

Slovakia			
Sales	**Sered**	SEW-Eurodrive SK s.r.o. Trnavska 920 SK-926 01 Sered	Tel. +421 31 7891311 Fax +421 31 7891312 sew@sew-eurodrive.sk

Slovenia			
Sales **Service**	**Celje**	Pakman - Pogonska Tehnika d.o.o. UI. XIV. divizije 14 SLO – 3000 Celje	Tel. +386 3 490 83-20 Fax +386 3 490 83-21 pakman@siol.net

South Africa			
Assembly **Sales** **Service**	**Johannesburg**	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 494-3104 dross@sew.co.za
	Capetown	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 dswanepoel@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaceo Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700-3451 Fax +27 31 700-3847 dtait@sew.co.za

Spain			
Assembly **Sales** **Service**	**Bilbao**	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. +34 9 4431 84-70 Fax +34 9 4431 84-71 sew.spain@sew-eurodrive.es

Sweden			
Assembly **Sales** **Service**	**Jönköping**	SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping	Tel. +46 36 3442-00 Fax +46 36 3442-80 http://www.sew-eurodrive.se info@sew-eurodrive.se

Switzerland			
Assembly **Sales** **Service**	**Basel**	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch

Thailand			
Assembly **Sales** **Service**	**Chon Buri**	SEW-EURODRIVE (Thailand) Ltd. Bangpakong Industrial Park 2 700/456, Moo.7, Tambol Donhuaroh Muang District Chon Buri 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.co.th

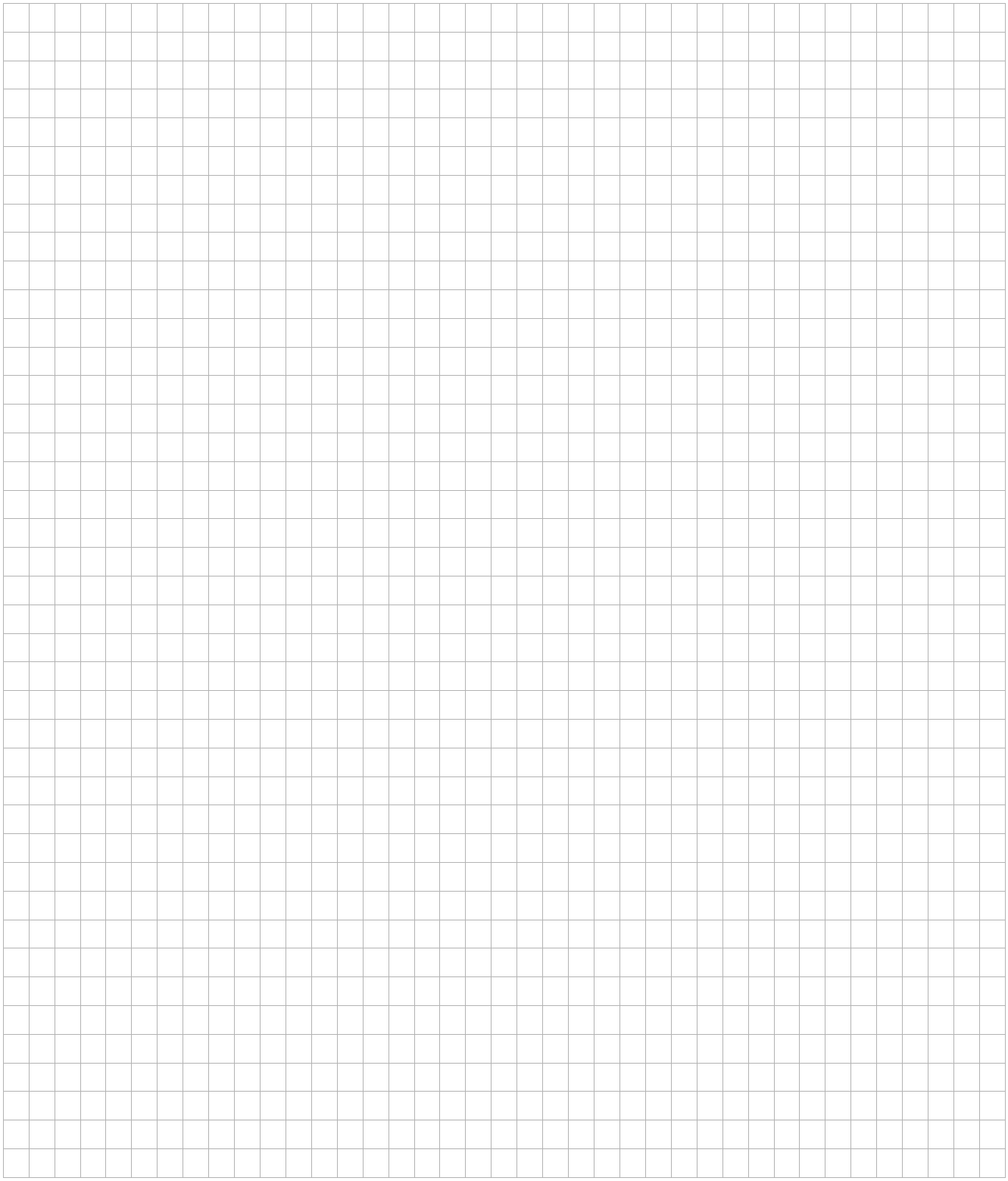
Tunisia			
Sales	**Tunis**	T. M.S. Technic Marketing Service 7, rue Ibn El Heithem Z.I. SMMT 2014 Mégrine Erriadh	Tel. +216 1 4340-64 + 1 4320-29 Fax +216 1 4329-76

Turkey			
Assembly **Sales** **Service**	**Istanbul**	SEW-EURODRIVE Hareket Sistemleri Sirketi Bagdat Cad. Koruma Cikmazi No. 3 TR-34846 Maltepe ISTANBUL	Tel. +90 216 4419163 + 216 4419164 + 216 3838014 Fax +90 216 3055867 sew@sew-eurodrive.com.tr

Ukraine			
Sales **Service**	**Dnepropetrovsk**	SEW-EURODRIVE Str. Rabochaja 23-B, Office 409 49008 Dnepropetrovsk	Tel. +380 56 370 3211 Fax +380 56 372 2078 sew@sew-eurodrive.ua

USA			
Production **Assembly** **Sales** **Service**	**Greenville**	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Manuf. +1 864 439-9948 Fax Ass. +1 864 439-0566 Telex 805 550 http://www.seweurodrive.com cslyman@seweurodrive.com
Assembly **Sales** **Service**	**San Francisco**	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, California 94544-7101	Tel. +1 510 487-3560 Fax +1 510 487-6381 cshayward@seweurodrive.com
	Philadelphia/PA	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Dayton	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 440-3799 cstroy@seweurodrive.com
	Dallas	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Additional addresses for service in the USA provided on request!		

Venezuela			
Assembly **Sales** **Service**	**Valencia**	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia, Estado Carabobo	Tel. +58 241 832-9804 Fax +58 241 838-6275 sewventas@cantv.net sewfinanzas@cantv.net



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Driving the world

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